VOLUME 128 NUMBER 5 • SEPTEMBER/OCTOBER 2013

PUBLIC HEALTH Reports

Publishing since 1878

www.publichealthreports.org

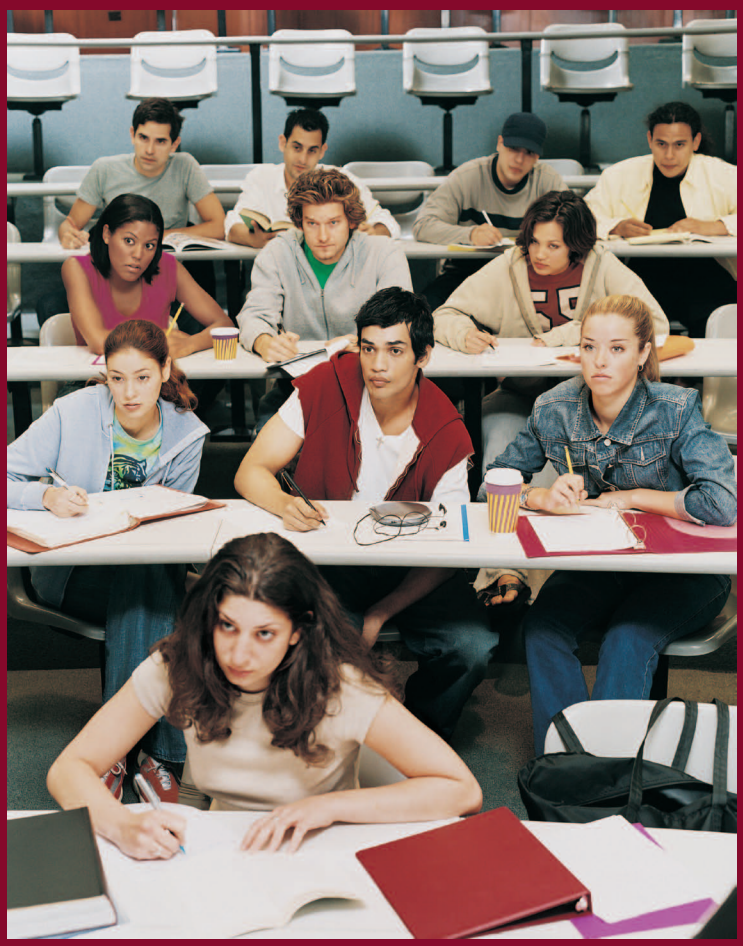


Photo: Thinkstock

ASSOCIATION OF SCHOOLS & PROGRAMS OF PUBLIC HEALTH

PUBLIC HEALTH *Reports*

Public Health Reports is the journal of the U.S. Public Health Service (PHS) and the Office of the U.S. Surgeon General and is published through an official agreement with the Association of Schools and Programs of Public Health (ASPPH), 1900 M St. NW, Ste. 710, Washington, DC 20036. All manuscripts are peer reviewed. Opinions expressed are the authors' and do not reflect the views of *Public Health Reports,* PHS, or ASPPH. Trade names are used for identification only and do not represent an endorsement by PHS or ASPPH. Printed on 30% recycled paper.

Mary Beth Bigley, *Acting Editor*

William Aldis
Joseph Bates
Hazel Dean
Zygmunt Dembek
Russell Kirby
Jan Lowery
Philip Nasca
Beth Resnick
Philip Smith
Betsy Thompson
Deputy Editors

Julie Keefe
Managing Editor

Mary McGonegle
Production Assistant

Jenny Reising
Jo Ellen Russ
Kate Wiseman
Scientific Editors

Marlynn May
Mark Robson
Sara Rosenbaum
David Rosner
Sandra Smith
Adam Spanier
Lorna Thorpe
Contributing Editors

Stephen Bertke
Geoffrey Calvert
Sean Cleary
Adele Franks
T. Stephen Jones
Lance Rodewald
Associate Editors

Indexed or abstracted in MEDLINE/PubMed, Current Contents, EMBASE/Excerpta Medica, Pais International, and LexisNexis.

A subscription form appears on the back cover.

Please visit the Journal's website at
http://www.publichealthreports.org

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Kathleen Sebelius
Secretary

PUBLIC HEALTH SERVICE
Boris D. Lushniak, MD, MPH
RADM, USPHS
Acting Surgeon General

ASSOCIATION OF SCHOOLS AND PROGRAMS OF PUBLIC HEALTH
John R. Finnegan, Jr., PhD
Chair, Board of Directors

Public Health Reports (ISSN 0033-3549; USPS 324-990) is the journal of the U.S. Public Health Service (PHS) and is published bimonthly by the Association of Schools and Programs of Public Health (EIN: 56-0734192). Business, accounting, and circulation offices: 1900 M St. NW, Ste. 710, Washington, DC 20036; tel. 877-478-2468, 202-296-1099; e-mail <info@aspph.org>. Periodicals postage paid at Washington, DC 20036 USA, and additional mailing offices.

POSTMASTER: Send address changes to *Public Health Reports*, c/o ASPPH, 1900 M St. NW, Ste. 710, Washington, DC 20036.

PUBLIC HEALTH *Reports*

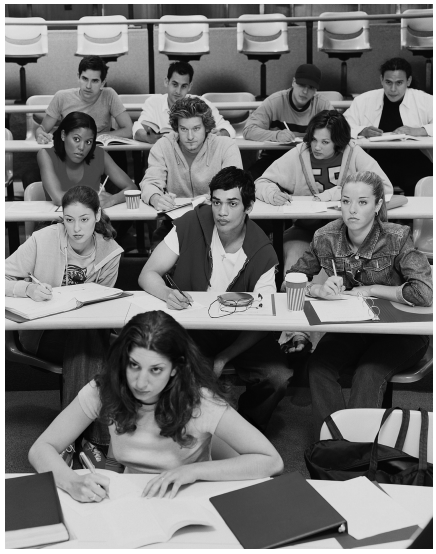


Photo: Thinkstock

FROM THE SCHOOLS AND PROGRAMS OF PUBLIC HEALTH

Subscription, Permission, and Copyright Information

Subscription is on a yearly basis. The annual rates are US $50 for students (print only), US $150 for individuals (print and online), US $90 for individuals (online or print only), and US $167 for institutions (print only). Pricing information for online institution subscriptions is available at http://www.publichealthreports.org. An international shipping charge of US $50 will apply to subscriptions outside of North America. Single issues are available for US $30 (PDF or limited quality of print available). All prices include postage. Individual rates are only applicable when a subscription is for individual use. All subscriptions, single issue orders, changes of address, inquiries, and claims for missing issues should be sent to: *Public Health Reports*, c/o ASPPH, 1900 M St. NW, Ste. 710, Washington, DC 20036; tel. 877-478-2468, 202-296-1099; e-mail <support@publichealthreports.org>.

Display, Classified, and Recruitment Advertising, Sponsorships, Supplements, and Reprint inquiries should be addressed to: *Public Health Reports*, c/o ASPPH, 1900 M St. NW, Ste. 710, Washington, DC 20036; tel. 877-478-2468, 202-296-1099; e-mail <support@publichealthreports.org>.

Requests for Permissions, Reprints, and Photocopies: All rights reserved; no part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission of: *Public Health Reports*, c/o ASPPH, 1900 M St. NW, Ste. 710, Washington, DC 20036; tel. 877-478-2468, 202-296-1099; e-mail <support@publichealthreports.org>.

It is a condition of publication in the Journal that authors assign copyright to the Association of Schools and Programs of Public Health (ASPPH). This ensures that requests from third parties to reproduce articles are handled efficiently and consistently and will also allow the article to be as widely disseminated as possible. Although assigning copyright, authors may use their own materials in other publications provided that *Public Health Reports* is acknowledged as the original place of publication.

Material published in this Journal may be used, modified, reproduced, and distributed by the U.S. government for government purposes.

Public Health Reports is printed on acid-free paper that meets the minimum requirements of ANSI Standard Z39.48-1984 (Permanence of Paper).

For more information about ASPPH, please visit http://www.aspph.org

Copyright ©2013 Association of Schools and Programs of Public Health

Advertising Rates
& Deadlines for Vol. 129

PUBLIC HEALTH *Reports*

www.publichealthreports.org

Public Health Reports (PHR) is a bimonthly peer-reviewed journal offering articles in three main areas: public health practice, research, and viewpoints/commentaries. PHR has been one of the public health community's key information resources for more than 130 years. PHR is distributed to members, the research community, academic libraries, government agencies, and many health-related industries.

DEADLINES*

Vol. 128, no. 6 (Nov/Dec 2013): **September 3, 2013**
Vol. 129, no. 1 (Jan/Feb 2014): **November 4, 2013**
Vol. 129, no. 2 (Mar/Apr 2014): **January 6, 2014**
Vol. 129, no. 3 (May/Jun 2014): **March 3, 2014**
Vol. 129, no. 4 (Jul/Aug 2014): **May 5, 2014**
Vol. 129, no. 5 (Sep/Oct 2014): **July 7, 2014**
Vol. 129, no. 6 (Nov/Dec 2014): **September 5, 2014**

*All ad submissions must first be approved by the editor and publisher for content and professionalism in keeping with the publication's standards.

ADVERTISING DESIGN

The ad can be designed from a Word document at no additional charge. Please be prepared to submit completed copy and high-resolution images.

The following file formats are accepted:
DOC, PDF, EPS, or high-resolution JPG.

GENERAL ADVERTISING RATES

PHR is printed in **black and white**; no color ads will be accepted.

	1x	3x	6x
Half page	**$250**	**$242**	**$235**
Full page	**$500**	**$480**	**$461**

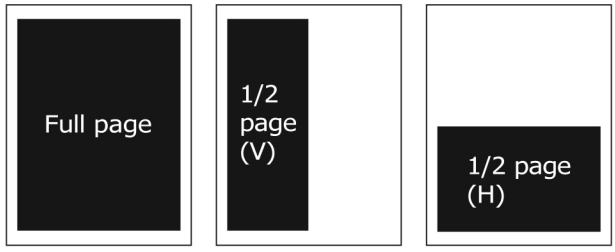
Discounted Rate:

	1x	3x	6x
Half page	**$200^**	**$194^**	**$188^**
Full page	**$400^**	**$384^**	**$369^**

^Discounted rate for members and affiliate organizations.

ASPPH ASSOCIATION OF SCHOOLS & PROGRAMS OF PUBLIC HEALTH

MECHANICAL REQUIREMENTS



Full page**: 7.25 x 9.75 inches
Half page Horizontal: 7.25 x 4 inches
Half page Vertical: 3.25 x 9.75 inches

**There are no bleeds. (The trim size of the finished journal is 8-1/4 x 10-3/4.)

SUBMISSION

E-mail ad copy to: scarter@aspph.org

Mail check payments to:
(payable to **Public Health Reports**)
Association of Schools and Programs of Public Health
1900 M Street NW, Suite 710
Washington, DC 20036

Questions: Stella Carter, 202-296-1099 ext 146

Payment must be submitted at the time the ad is submitted.

A Message from the Editor

This year, 2013, has been a busy year for the U.S. Department of Health and Human Services (HHS) to achieve the provisions of the Patient Protection and Affordable Care Act.[1] Some provisions have been put in place and others are to be launched by January 1, 2014. For public health, one of the key provisions established the National Prevention Council (hereafter, the Council).[2] The Council's vision, to advance prevention so that Americans can live longer, healthier lives,[3] is one we can all embrace and promote through our work to advance public health.

The Council, which is chaired by the U.S. Surgeon General, comprises 20 federal departments representing the environment, health, education, transportation, labor, housing, defense, and veterans. In 2011, the Council released the first ever National Prevention Strategy (NPS).[3] In 2012, the Council released the National Prevention Council Action Plan, commissioning the Council's federal departments to increase tobacco-free environments; improve access to healthy, affordable foods; and identify additional opportunities for other agencies to consider prevention and health. Additionally, Council member departments committed to more than 200 individual actions prioritizing prevention through innovative programs and proven initiatives.[4]

Since the release of the National Prevention Council Action Plan, the Council and its partners have been working to bring the NPS to life. The 2013 National Prevention Council Annual Status Report to Congress and the President, which was delivered in July, publicized the many achievements of the Council and its partners. Overall, more than 200 federal actions outlined in the National Prevention Council Action Plan are either in progress or have been fully implemented.[5]

Eleven council departments have committed to increasing access to healthy, affordable food. From providing fresh fruit and vegetables to increasing healthy food options in vending machines and at dining facilities, they are providing healthy choices for their employees, customers, and partners.

Nine Council departments are focusing on tobacco-free environments. The U.S. Environmental Protection Agency has strengthened policies that cover 17,500 employees by creating tobacco- and smoke-free environments for their employees, customers, and partners. The U.S. Department of Veterans Affairs developed tobacco cessation telehealth programs to reduce the current smoking rate among veterans.[5]

Twelve council departments are identifying opportunities for prevention and health. The Department of Defense Healthy Base Initiative is one that aims to improve overall health and wellness for service members, their families, and civilians.[5]

The exciting news from the Council's work is the more than 330 collaborations across 140 council departments with external partners. The U.S. Department of Housing and Urban Development, partnering with HHS, the American Lung Association, and the American Academy of Pediatrics, has encouraged the adoption and implementation of smoke-free multifamily housing policies by developing toolkits with information on smoke-free living. The U.S. Department of Interior's Bureau of Indian Affairs has partnered with the Notah Begay III Foundation and Nike N7 to to combat childhood obesity and type 2 diabetes in Native American and Aboriginal communities.[5] And the Association of State and Territorial Health Officials and the National Association of County and City Health Officials have developed Web-based toolkits to support efforts at the state and local level.[6]

When the Council released the NPS, one of the key messages was that it was a national strategy not a federal one. It is outstanding to see federal departments collaborating with external partners to achieve the vision of the NPS. Together with federal leadership and an engaged public health community, we can achieve the NPS's vision of "working together to improve the health and quality of life for individuals, families, and communities by moving the nation from a focus on sickness and disease to one based on prevention and wellness."[3]

Mary Beth Bigley, DrPH, MSN, ANP

REFERENCES

1. Pub. L. No. 111-148 (2010).
2. Department of Health and Human Services (US). National Prevention Council [cited 2013 Jul 3]. Available from: URL: http://www.surgeongeneral.gov/initiatives/prevention/about/index.html
3. Department of Health and Human Services (US). National Prevention Strategy [cited 2013 Jul 3. Available from: URL: http://www.surgeongeneral.gov/initiatives/prevention/strategy/index.html
4. Department of Health and Human Services (US). National Prevention Council Action Plan: implementing the National Prevention Strategy [cited 2013 Jul 3]. Available from: URL: http://www.surgeongeneral.gov/initiatives/prevention/about/actionplan.html
5. Office of the Surgeon General (US). 2013 National Prevention Council annual status report [cited 2013 Jul 10]. Available from: URL: http://www.surgeongeneral.gov/initiatives/prevention/2013-npc-status-report.pdf
6. Association of State and Territorial Health Officials. Health in All Policies: strategies to promote innovative leadership [cited 2013 Jul 5]. Available from: URL: http://www.astho.org/Programs/Prevention/Implementing-the-National-Prevention-Strategy/HiAP-Toolkit

Surgeon General's Perspectives

THE IMPORTANCE OF 60 MINUTES OR MORE OF DAILY PHYSICAL ACTIVITY

VADM Regina M. Benjamin,
18th U.S. Surgeon General

Physical activity is fundamental for achieving optimal health at each stage in life and central to prevention programs and policies at every level. While many of us recognize that active living is key to reaching and maintaining a healthy weight, the long-term health benefits of regular physical activity extend far beyond a number on a scale. Being physically active can reduce the risk of dangerous chronic conditions such as heart disease, certain cancers, high blood pressure, and type 2 diabetes regardless of age, race/ethnicity, weight, or physical ability.[1] Still, many of us do not get the physical activity we need to enjoy a healthy, long life. In the United States, an estimated one out of every 10 premature deaths is associated with physical inactivity.[2]

In 2008, the U.S. Department of Health and Human Services (HHS) released the landmark "Physical Activity Guidelines for Americans" (hereafter, PAG) to help Americans improve their health and fitness through an active lifestyle. The PAG presents the first-ever set of comprehensive, evidence-based national recommendations for the types and amounts of physical activity Americans need for health, and serves as the basis for programs and policies nationwide. According to the PAG, young people aged 6–17 years need at least one hour of daily physical activity, while adults need 2.5 hours of physical activity each week, or about 30 minutes per day for five or more days each week.[1] Regular physical activity should include a variety of moderate and vigorous activities, as well as muscle-strengthening activities.

During our earliest years, regular physical activity is important for growth and development, and those who are regularly active during childhood and adolescence have a better chance of remaining healthy throughout adulthood.[1] Yet, many of America's young people simply aren't moving enough. Levels of physical activity for young people fall short of recommendations, while opportunities to be active are limited in many schools and communities across the nation. Today, fewer than 20% of adolescents engage in the recommended levels of physical activity,[3] and daily physical education exists in a mere 4% of elementary schools, 8% of middle schools, and 2% of high schools.[4]

In March 2013, HHS released the "Physical Activity Guidelines for Americans Midcourse Report: Strategies to Increase Physical Activity in Youth" (hereafter, PAG Midcourse Report), which dives even deeper into the scientific literature to identify evidence-based strategies for increasing physical activity levels in Americans aged 3–17 years. With a focus on the places young people live, learn, and play, the PAG Midcourse Report describes key opportunities and approaches for getting America's young people moving more in five important settings: schools, preschools and childcare centers, communities, family and home, and primary health-care settings.[5]

All of us play an important role in providing opportunities for young people to be active. Like the National Prevention Strategy, our nation's first-ever comprehensive prevention plan,[6] the PAG Midcourse Report underscores the importance of collaborative efforts to enhance physical activity programs and opportunities in schools and early learning centers, and encourages changes to the built environment that facilitate physical activity.

It is essential to have ongoing efforts that improve the quality and availability of well-designed PE programs in our nation's schools, and help shift the perception that physical activity is a competing rather than a complimentary priority. Physical activity can help improve grades, standardized test scores, and classroom behavior, as well as enhance concentration and

attention.[7] In addition to physical education programs, bouts of physical activity can fit into the school day as classroom activity breaks, before- and after-school activities, and active transportation to and from school.

We should also help children develop active lifestyles even earlier by increasing physical activity in preschool and early care and education centers. Small steps can make a big difference. For example, increasing the time children spend outside, providing portable play equipment (e.g., balls, jump ropes, and tricycles) on playgrounds, and ensuring staff are properly trained to deliver physical activity instruction are ways to get kids moving more in these important settings.

Finally, supporting changes to our communities allows Americans of all ages to live, work, and play in environments that facilitate healthy, active lifestyles. Collaboration and coordination across many fields is particularly important for comprehensive community interventions aiming to improve the built environment. Ensuring that stakeholders from transportation, urban planning, and public safety are at the table is a critical first step for creating healthier physical environments.

During my time as America's Doctor, I have strived to provide Americans with the best scientific information available on how to live healthier lives. The PAG Midcourse Report deepens our understanding of how we can empower America's young people to develop physical activity habits that will help them enjoy longer, healthier lives. Together, we can make strides toward becoming a healthy and fit nation by ensuring that America's young people have opportunities for enjoyable, age-appropriate physical activity in the places they live, learn, and play.

It has been an honor to serve as your Surgeon General. I thank President Obama for the honor he bestowed on me. When I was appointed the 18th Surgeon General on July 13, 2009, in the Rose Garden, I spoke of wanting to prevent other Americans from suffering the loss of loved ones, as I had, due to preventable illnesses, such as smoking-related lung cancer, stroke, and human immunodeficiency virus. My goal was to create a grassroots movement, to change our health-care system from one focused on sickness and disease to a system focused on wellness and prevention. With your help, that movement has begun.

Public Health Reports will continue to be a vehicle for disseminating public health research and practice under the tutelage of the Acting Surgeon General, Rear Admiral Boris D. Lushniak, MD, MPH. Thank you for your support of my vision to improve the health of our nation by focusing on prevention.

The author thanks Amber L. Mosher, MPH, RD, and Katrina L. Butner, PhD, RD, ACSM-CES, in the U.S. Department of Health and Human Services Office of Disease Prevention and Health Promotion for their contributions to this article.

Regina M. Benjamin, MD, MBA
18th U.S. Surgeon General

REFERENCES

1. Department of Health and Human Services (US). Physical activity guidelines for Americans. Washington: HHS; 2008.
2. Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT, et al. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. Lancet 2012;380:219-29.
3. Song M, Carroll DD, Fulton JE. Meeting the 2008 physical activity guidelines for Americans among U.S. youth. Am J Prev Med 2013;44:216-22.
4. Department of Health and Human Services (US). School Health Policies and Practices Study (SHPPS) 2006: overview. 2007 [cited 2013 May 8]. Available from: URL: http://www.cdc.gov/healthyyouth/shpps/2006/factsheets/pdf/FS_Overview_SHPPS2006.pdf
5. Physical Activity Guidelines for Americans Midcourse Report Subcommittee of the President's Council on Fitness, Sports and Nutrition (US). Physical activity guidelines for Americans midcourse report: strategies to increase physical activity among youth. Washington: Department of Health and Human Services (US); 2012. Also available from: URL: http://www.health.gov/paguidelines/midcourse/pag-mid-course-report-final.pdf [cited 2013 May 8].
6. Department of Health and Human Services (US). National Prevention Strategy [cited 2013 May 23]. Available from: URL: http://www.surgeongeneral.gov/initiatives/prevention/strategy
7. Centers for Disease Control and Prevention (US). The association between school-based physical activity, including physical education, and academic performance. Atlanta: CDC; 2010.

Letter to the Editor

EVIDENCE OF PHARMACIST CARE TO PREVENT CARDIOVASCULAR DISEASE

We have read with great interest the article by Rear Admiral Scott Giberson, which appeared in the January/February 2013 issue of *Public Health Reports*.[1] The author elegantly discussed the valuable role of the pharmacist in the prevention of coronary heart diseases and chronic care of patients with heart diseases. The author also presented the pharmacist-specific activities related to Million Hearts®, a national initiative to prevent one million heart attacks and strokes in the U.S. during the next five years by implementing proven and effective interventions with the collaboration of health-care professionals, pharmacists, hospitals, communities, and individuals.[2,3]

We would like to expand the message of Rear Admiral Giberson by underlining the results of two recent systematic reviews and meta-analyses of randomized controlled trials (RCTs) that have evaluated the impact of pharmacist care in the management of cardiovascular disease (CVD) risk factors.[4,5] In the studies reviewed, the interventions were exclusively conducted by community, hospital, or clinical pharmacists and implemented in collaboration with physicians or nurses among outpatients with hypertension, dyslipidemia, smoking, or obesity;[4] or implemented among outpatients with diabetes (type 1 and 2).[5] The studies were primarily conducted in the U.S. and Canada, but also in South America, Asia, Australia, and Europe.

In the first systematic review, we identified 30 RCTs involving 11,765 patients.[4] Pharmacists intervened in diverse ways, including patient education (counseling about medications, lifestyle, or compliance); feedback to physicians (recommendations regarding medication changes); medication management from medical records or patient interview; measurement of CVD risk factors or reviewing of laboratory results during follow-up; patient-reminder systems including telephone contact, use of website, home visits, or drug adherence aids; and educational intervention for health-care professionals. We found that pharmacist interventions significantly reduced systolic and diastolic blood pressure (BP), total cholesterol, low-density lipoprotein cholesterol, and the risk of smoking[4] (Table).

In the second systematic review, we analyzed 15 RCTs involving 9,111 participants with diabetes. Frequently conducted pharmacist interventions included medication management (monitoring of drug therapy) and educational interventions to patients (education and counseling about medications and lifestyle). Compared with usual care, pharmacist care was associated with substantial reductions for systolic BP (−6.2 millimeters of mercury [mmHg] [95% confidence interval (CI) −7.8, −4.6]), diastolic BP (−4.5 mmHg [95%

Table. Effect of pharmacist care on cardiovascular risk factors among outpatients with cardiovascular disease in 30 studies conducted in North America, Asia, Australia, and Europe, 1973–2010[a]

Risk factors	*Studies* N	*Participants* N	*Difference between pharmacist care and usual care Mean differences or relative risk (95% CI)*
Systolic BP (mmHg)	19	10,479	−8.1 (−10.2, −5.9)
Diastolic BP (mmHg)	19	10,479	−3.8 (−5.3, −2.3)
Total cholesterol (mg/dL)	9	1,121	−17.4 (−25.5, −9.2)
LDL cholesterol (mg/dL)	7	924	−13.4 (−23.0, −3.8)
Smoking	2	196	0.77 (0.67, 0.89)

[a]Adapted from: Santschi V, Chiolero A, Burnand B, Colosimo AL, Paradis G. Impact of pharmacist care in the management of cardiovascular disease risk factors: a systematic review and meta-analysis of randomized trials. Arch Intern Med 2011;171:1441-53.

CI = confidence interval

BP = blood pressure

mmHg = millimeters of mercury

mg/dL = milligrams per deciliter

LDL = low-density lipoprotein

CI −6.2, −2.8]), total cholesterol (−15.2 milligrams per deciliter [mg/dL] [95% CI −24.7, −5.7]), low-density lipoprotein cholesterol (−11.7 mg/dL [95% CI −15.8, −7.6]), and even body mass index (−0.9 kilograms per meter squared [95% CI −1.7, −0.1]) (data not shown).[5]

Both reviews provide extensive evidence that pharmacist care—conducted alone or as part of team-based care including physicians, nurses, or other health-care professionals—improves the management of various CVD risk factors among outpatients with or without diabetes. In our opinion, and as mentioned by Zenzano et al,[6] pharmacists can expand access to care by collaborating in a model of team-based care, especially in the field of prevention. The Million Hearts® campaign is an extraordinary example of multidisciplinary care and an opportunity for pharmacists to play a vital role in managing cardiovascular health and to expand collaboration in team-based care among health-care professionals.[2]

Valérie Santschi, PharmD, PhD[a]
Gilles Paradis, MD, MSc[b]

[a]Lausanne University Hospital, Institute of Social and Preventive Medicine, Lausanne, Switzerland

[b]McGill University, Department of Epidemiology, Biostatistics and Occupational Health, Montreal, Canada

REFERENCES

1. Giberson SF. Million Hearts®: pharmacist-delivered care to improve cardiovascular health. Public Health Rep 2013;128:2-6.
2. Department of Health and Human Services (US). Million Hearts®: the initiative: overview [cited 2013 Jan 11]. Available from: URL: http://millionhearts.hhs.gov/aboutmh/overview.html
3. Frieden TR, Berwick DM. The "Million Hearts" initiative—preventing heart attacks and strokes. N Engl J Med 2011;365:e27.
4. Santschi V, Chiolero A, Burnand B, Colosimo AL, Paradis G. Impact of pharmacist care in the management of cardiovascular disease risk factors: a systematic review and meta-analysis of randomized trials. Arch Intern Med 2011;171:1441-53.
5. Santschi V, Chiolero A, Paradis G, Colosimo AL, Burnand B. Pharmacist interventions to improve cardiovascular disease risk factors in diabetes: a systematic review and meta-analysis of randomized controlled trials. Diabetes Care 2012;35:2706-17.
6. Zenzano T, Allan JD, Bigley MB, Bushardt RL, Garr DR, Johnson K, et al. The roles of healthcare professionals in implementing clinical prevention and population health. Am J Prev Med 2011;40:261-7.

Measuring What Matters: Development of Standard HIV Core Indicators Across the U.S. Department of Health and Human Services

Ronald O. Valdiserri, MD, MPH[a]
Andrew D. Forsyth, PhD[a]
Vera Yakovchenko, MPH[a]
Howard K. Koh, MD, MPH[b]

"If you cannot measure it, you cannot improve it."

—Lord Kelvin

As noted by public health leaders, efforts to define and monitor quality in systems that deliver population health services have lagged behind comparable efforts in systems that deliver clinical health services.[1] One potential reason for this disparity is the observation that the aims of medical care are arguably more apparent—and certainly more immediate—than those of public health, focusing on the well-being of individuals rather than on the health of entire populations. Moreover, while quality improvement is predicated upon the ability to measure and monitor inputs and outputs in a consistent way,[2] data collected by various public health systems are often not standardized, with inconsistent case definitions, specifications, and time frames.[3,4] Hence, it is difficult to analyze data across multiple public health systems to improve the coordination of prevention services, intervention effectiveness, and cost-effectiveness.[5]

The challenges in assessing public health quality have particular relevance to federally funded human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) programs. For the most part, federal programs supporting the prevention, diagnosis, and treatment of HIV have arisen, been funded, and been administered independently from one another. Hence, they typically capture data in different ways, using varied terminology standards, time frames, and reporting systems.[6] In practical terms, this variability means that despite the plethora of required indicators and reporting requirements, federally funded systems of HIV prevention, care, and treatment—even those providing services to the same individuals—currently cannot meaningfully integrate critical performance data across the continuum of HIV care.[7]

To overcome this limitation, the National HIV/AIDS Strategy (NHAS) called for the standardization of data collection and grantee reporting requirements as a means of promoting a more coordinated national response across HIV/AIDS programs that are funded and administered by different federal agencies and offices.[8] The NHAS also called for the federal government to simplify grant administration activities and streamline grantee reporting requirements for federal HIV programs.

[a]U.S. Department of Health and Human Services, Office of HIV/AIDS and Infectious Disease, Washington, DC

[b]U.S. Department of Health and Human Services, Washington, DC

Address correspondence to: Ronald O. Valdiserri, MD, MPH, U.S. Department of Health and Human Services, Office of HIV/AIDS and Infectious Disease, 200 Independence Ave. SW, HHH Building, Room 443-H, Washington, DC 20201; tel. 202-690-5560; fax 202-690-7560; e-mail <ron.valdiserri@hhs.gov>.

BACKGROUND

Initial movement toward a more coordinated federal response to HIV/AIDS started shortly after the NHAS was released in mid-July 2010. At that time, the Department of Health and Human Services (HHS), along with the other key federal partners (i.e., Department of Justice, Department of Labor, Department of Housing and Urban Development, Department of Veterans Affairs, and the Social Security Administration), began to develop required operational plans. These plans outlined specific actions to advance the strategy along with steps "to strengthen coordination in planning, budgeting for, and evaluating domestic HIV/AIDS programs within and across agencies."[9] One of the specific actions to which HHS committed in its operational plan was "to develop common measures and evaluation strategies to assess process and outcomes as they relate to the goals of the NHAS."[10] HHS acted upon this commitment on April 11, 2012, when Secretary Kathleen Sebelius issued an action memorandum to the heads of HHS' operating divisions and staff offices directing that they had to:

- Within 90 days, finalize a set of common, core HIV/AIDS indicators;
- In the subsequent 90 days, work with the Office of the Assistant Secretary for Health (OASH) to develop an implementation plan to deploy the core indicators, streamline data collection, and reduce reporting burden by at least 20%–25% for HHS grantees providing HIV services; and
- Within 15 months of reaching consensus on the common core indicators and their specifications, fully deploy the implementation plans.

Within OASH, the Office of HIV/AIDS and Infectious Disease Policy (OHAIDP) worked with colleagues across HHS to identify principles to guide the development of a set of standardized, HIV core indicators. It was agreed that the core indicators should:

- Provide a coherent assessment of HHS progress toward achieving NHAS goals;
- Constitute the smallest set of core measures that could reasonably provide a meaningful assessment of federally funded HIV prevention, treatment, and care services;
- Rely, to the extent possible, on existing data;
- Be grounded in the latest scientific evidence;
- Be deemed of adequate quality for use in policy and program decision-making; and
- Reflect the input and perspectives of funders, grantees, and other stakeholders.

To inform the development of the proposed indicators, OHAIDP began by cataloguing the existing HIV indicators as well as their corresponding data systems and elements that are used within each of the HHS agencies and staff offices providing HIV services. Additional guidance was derived from a review of HIV prevention, treatment, and care metrics and their standardization by the National Quality Forum (NQF), the National Committee for Quality Assurance, other federal entities (e.g., Department of Veterans Affairs and Department of Housing and Urban Development), and the private sector.[11–13] This review confirmed that HIV measures in use across HHS were characterized by substantial variation in definitions and specifications that manifested as noncomparable numerators, denominators, and reporting frames. For example, the assessment revealed five different ways that HHS programs were asked to tally a positive HIV diagnosis; four ways in which the initiation of antiretroviral therapy (ART) was to be recorded; three different measures of viral load suppression; and two measures each of early HIV diagnosis, linkage to HIV medical care, and sustained engagement in HIV medical care (Personal communication, Andrew Forsyth, OHAIDP, April 2012).

To reach agreement on a core set of HIV indicators and establish standard data definitions and data elements for each, OHAIDP then convened a cross-agency workgroup that included representatives from the Centers for Disease Control and Prevention (CDC), the Health Resources and Services Administration (HRSA), the Indian Health Service, the Substance Abuse and Mental Health Services Administration (SAMHSA), the National Institutes of Health, and the Centers for Medicare & Medicaid Services (CMS). To ensure that the discussions were not merely limited to a federal perspective, two technical consultations, one in September 2011 and the other in June 2012, provided an opportunity for external stakeholders from academia, state and local health departments, community-based organizations, and national policy organizations to contribute to this critical series of discussions.[14] Another important resource that informed these discussions was the Institute of Medicine report, "Monitoring HIV Care in the United States: Indicators and Data Systems." This expert committee was convened, at the behest of the Office of National AIDS Policy, to identify core indicators related to continuous HIV clinical care and access to supportive services. The report identified 14 core indicators for HIV clinical care and mental health, substance abuse, and supportive services. It also detailed potential sources of data to assess the indicators.[6]

RECOMMENDED HIV CORE INDICATORS

On July 24, 2012, HHS Secretary Sebelius approved a package of seven core HIV indicators that were developed based on the aforementioned inputs.[15] Figure 1 lists the seven core HIV indicators along with a description of their numerators and denominators. Six of the indicators are directly related to the so-called "HIV treatment cascade" (i.e., the depiction, at a population level, of the proportion of HIV-infected people in the U.S. who are receiving continuous HIV care resulting in viral suppression).[16,17] The seventh indicator, which addresses housing status, is indirectly related to the treatment cascade[18] but emphasizes the importance of a social determinants approach to HIV and public health.

Summarizing the continuum of HIV treatment, beginning at diagnosis and extending through viral suppression, provides a useful model to describe the progress and challenges that we face, as a nation, in achieving the NHAS goals. As shown in Figure 2, CDC estimates that in 2009 (the most recent analysis available), only 25% of the more than 1.1 million people living with HIV in America had achieved viral suppression. Maintaining an undetectable viral load is not only associated with better clinical outcomes, it also reduces the risk of transmitting the virus to others.[19] Thus, one of the primary goals for initiating ART is to maximally and durably suppress plasma HIV viral load.[20] In fact, the NHAS identifies increases in the proportion of racial/ethnic and sexual minority groups with undetectable (HIV) viral loads as a key measure for assessing our success in reducing HIV-related disparities and health inequities.[8]

As Figure 2 reveals, substantial attrition occurs at each step of the treatment cascade. Namely, of the nearly 1.1 million people infected with HIV in the U.S., about 18% have not been diagnosed. Further, it is estimated that one-third of the 1.1 million people with HIV have not been linked to care, that nearly two-thirds are not retained in HIV care, and that two-thirds are not prescribed ART. Clearly, to achieve the medical and public health goal of a suppressed HIV viral load, we must intervene at each stage of the treatment cascade by striving to improve the early diagnosis of HIV infection, timely linkage to and retention in care for those who have been diagnosed, awareness of the current U.S. treatment guidelines recommending ART

Figure 1. HHS-endorsed core indicators for monitoring HHS-funded HIV services

Core indicator	*Numerator*	*Denominator*
HIV positivity	Number of HIV-positive tests in the 12-month measurement period	Number of HIV tests conducted in the 12-month measurement period
Late HIV diagnosis	Number of people with a diagnosis of Stage 3 HIV infection (AIDS) within three months of diagnosis of HIV infection in the 12-month measurement period	Number of people with an HIV diagnosis in the 12-month measurement period
Linkage to HIV medical care	Number of people who attended a routine HIV medical care visit within three months of HIV diagnosis	Number of people with an HIV diagnosis in the 12-month measurement period
Retention in HIV medical care	Number of people with an HIV diagnosis who had at least one HIV medical care visit in each six-month period of the 24-month measurement period, with a minimum of 60 days between the first medical visit in the prior six-month period and the last medical visit in the subsequent six-month period	Number of people with an HIV diagnosis with at least one HIV medical care visit in the first six months of the 24-month measurement period
ART among people in HIV medical care	Number of people with an HIV diagnosis who were prescribed ART in the 12-month measurement period	Number of people with an HIV diagnosis and who had at least one HIV medical care visit in the 12-month measurement period
Viral load suppression among people in HIV medical care	Number of people with an HIV diagnosis with a viral load of <200 copies/milliliter at last test in the 12-month measurement period	Number of people with an HIV diagnosis and who had at least one HIV medical care visit in the 12-month measurement period
Housing status	Number of people with an HIV diagnosis who were homeless or unstably housed in the 12-month measurement period	Number of people with an HIV diagnosis receiving HIV services in the last 12 months

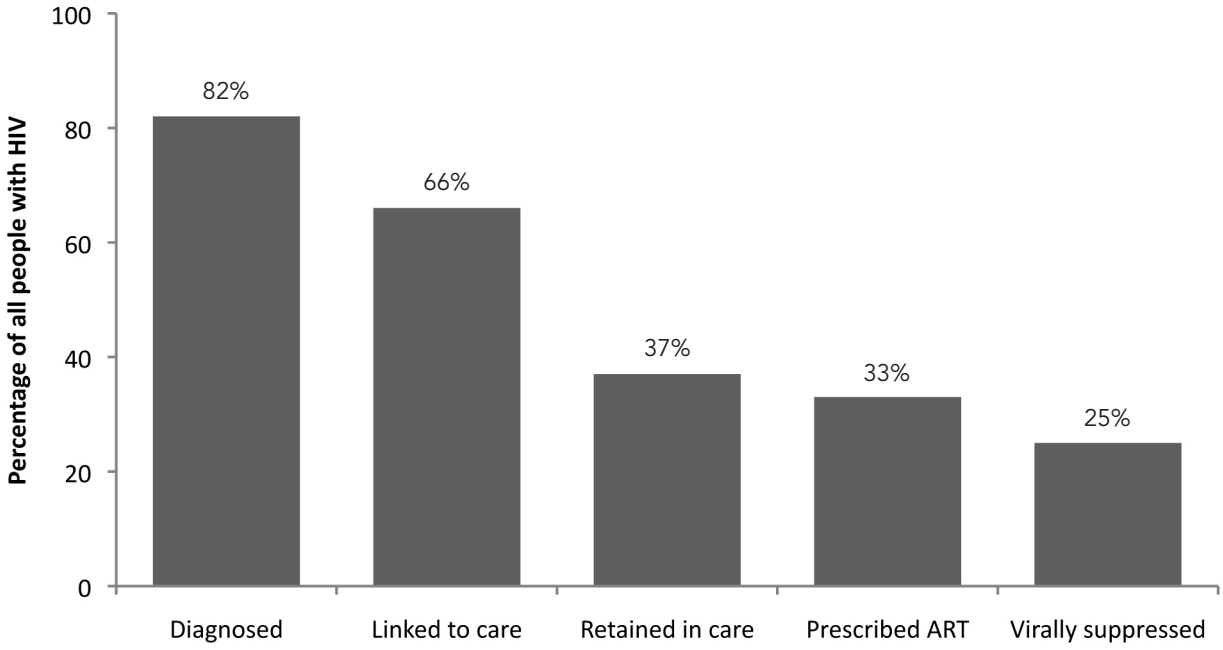
HHS = Department of Health and Human Services

HIV = human immunodeficiency virus

AIDS = acquired immunodeficiency syndrome

ART = antiretroviral therapy

Figure 2. HIV in the United States: the stages of care for the 1.1 million Americans living with HIV, 2009[a]



[a]Source: Centers for Disease Control and Prevention (US), National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Key graphics from CDC analysis showing proportion of people engaged in each of the five main stages of HIV care [cited 2013 May 7]. Available from: URL: http://www.cdc.gov/nchhstp/newsroom/2012/Continuum-of-Care-Graphics.html

HIV = human immunodeficiency virus

ART = antiretroviral therapy

for all HIV-infected individuals,[20] and individual and structural support to maintain treatment adherence, including adequate housing.[21]

As they were directed by HHS Secretary Sebelius in April 2012, each of the HHS operating divisions and staff offices providing HIV services has developed an individual plan to deploy core indicators, and implementation efforts are underway. These plans also detail actions that will be undertaken to streamline HIV program data collection and reduce HIV grantee reporting burden by at least 20%–25%. In fact, after reviewing the submitted implementation plans, agencies and offices report an average expected decrease of 39% in the number of required HIV indicators and an average expected decrease in required reporting frequencies of 29%, thus exceeding the initial target. Ongoing engagement with HHS operating divisions is expected to identify additional opportunities for further data streamlining.

PUBLIC HEALTH PRACTICE IMPLICATIONS

While delegating the management of different aspects of comprehensive HIV prevention, care, and treatment to different organizational units across HHS has enhanced implementation capacity, it has also added to the complexity of monitoring across programs in a holistic manner. For example, a client may be receiving HIV prevention services from a CDC-funded program, HIV treatment services from an HRSA-funded program, and substance abuse and/or mental health services from a SAMHSA-funded program. The implementation of these core indicators across HHS will enable the department to substantially improve the interoperability of key data required to monitor and assess HIV efforts across its operating divisions and will support HHS efforts to advance a diverse array of HIV programs and activities that are administered in a variety of organizational units.

A 2013 report published by the HHS Office of the Inspector General (OIG) highlights the need for and utility of common metrics to assess federally funded HIV program activities.[22] The objective of the report was to determine the extent to which HRSA-funded health center sites had implemented CDC's 2006 guidelines, which recommended routine HIV testing in health-care settings for all people aged 13–64 years. The report found that financial constraints and other factors affected full implementation of the CDC HIV testing recommendations. In addition, and more

directly relevant to the focus of this discussion, OIG made note of the "recently released seven core indicators" and observed that their adoption "would align data collection by HRSA health center grantees with that of other HHS-funded HIV programs and services" and would raise awareness of HIV testing as "critical to reducing the spread of HIV."[23]

Recent national analyses from CDC show continuing demographic disparities along the continuum of HIV care from diagnosis through viral suppression; African Americans and young people in the U.S. are least likely to receive ongoing care and effective treatment for HIV.[17] The implementation of standardized HIV program measures and demographic variables across HHS programs will enable policy makers and program managers to better identify and address these and similar service gaps and will provide the "minimum floor of data" that public health analysts have called for as necessary to assess and respond to health disparities such as HIV/AIDS.[24]

This brief report also describes the first steps toward minimizing or removing unwarranted, minimally useful, and/or duplicative HIV/AIDS reporting requirements. Requests to reduce HIV program reporting burden have been voiced by directors of state and territorial AIDS programs[25] and are called for in the NHAS.[8] Policy analysts, writing broadly about federal grant reporting requirements, have likewise noted that there has been a pronounced tendency in grants management toward "proliferation of requirements and requests for data" without a "clear correlation between those requirements and grantee performance."[26] As such, our efforts to streamline and better focus HIV/AIDS program reporting requirements are in line with recommendations being raised in other publicly funded service programs.

To paraphrase Winston Churchill, we are nearing "the end of the beginning" when it comes to expanding our capacity to monitor federally funded HIV/AIDS programs in an integrated, streamlined fashion. Substantial collaborative work has gone into identifying the core HIV measures and agreeing on other measures that can be removed or reduced because they are less informative. The expected costs for implementing these recommendations are not anticipated to be excessive but may include resources for technical assistance, training, or programming associated with revised data collection instruments and processes that will be required to deploy the core indicators and reduce data elements and reporting requirements. HHS intends to conduct further work to assess return on investment and the benefits of adopting core indicators and streamlining HIV data collection. Clearly, competent program monitoring is not the sole requirement for ensuring successful health outcomes for HIV or any other public health program. But as we move forward in our collective efforts to achieve the goals of the NHAS, we would do well to remember advice from another citizen of the United Kingdom, Lord Kelvin, who cautioned that, "If you cannot measure it, you cannot improve it."

The authors recognize the contributions of the following federal colleagues who helped to identify and specify the seven core indicators described in this article: Lisa Backus, MD, PhD; Sonsiere Cobb-Souza, MS; Fred J. Hellinger, PhD; Barbara F. James, MPH; Cara V. James, PhD; Aaron M. Lopata, MD; Faye Malitz, MS; Tracy Matthews, MS; Gregorio Millett, MPH; Lisa Neel, MPH; Amy B. Richter, MSW; Alek Sripipatana, PhD; Gretchen Stiers, PhD; Rene Sterling, PhD, MHA; Vanessa White, MPH; Michele R. Williams, PhD; and Richard Wolitski, PhD.

The seven indicators described herein were officially endorsed by the U.S. Department of Health and Human Services Office of the Secretary on July 24, 2012.

REFERENCES

1. Honore PA, Wright D, Berwick DM, Clancy CM, Lee P, Nowinski J, et al. Creating a framework for getting quality into the public health system. Health Aff (Millwood) 2011;30:737-45.
2. Conway PH, Clancy C. Transformation of health care at the front line. JAMA 2009;301:763-5.
3. Neumann PJ, Jacobson PD, Palmer JA. Measuring the value of public health systems: the disconnect between health economists and public health practitioners. Am J Public Health 2008;98:2173-80.
4. Public Health Data Standards Consortium and Association of Public Health Laboratories. HIT standards in public health laboratory domain [cited 2013 May 6]. Available from: URL: http://phdsc.org/standards/phlab-data-exchange.asp
5. Public Health Data Standards Consortium. Business case: the role of public health in national health information technology standardization [cited 2013 May 6]. Available from: URL: http://www.phdsc.org/standards/business_case.asp
6. Institute of Medicine, Committee to Review Data Systems for Monitoring HIV Care. Monitoring HIV care in the United States: indicators and data systems. Washington: National Academies Press; 2012.
7. John Snow, Inc. Evaluation of the 12 Cities Project: one strategy to improve coordination, collaboration, and integration. Boston: John Snow, Inc.; 2012.
8. Office of National AIDS Policy (US). National HIV/AIDS strategy for the United States. Washington: Office of National AIDS Policy; 2010.
9. White House (US). Presidential memorandum—implementation of the National HIV/AIDS Strategy [press release] 2010 Jul 13 [cited 2012 Dec 27]. Available from: URL: http://www.whitehouse.gov/the-press-office/presidential-memorandum-national-hivaids-strategy
10. Office of the Assistant Secretary for Health (US). HHS operational plan: achieving the vision of the National HIV/AIDS Strategy. Washington: Department of Health and Human Services (US); 2011. Also available from: URL: http://www.aids.gov/federal-resources/national-hiv-aids-strategy/nhas-operational-plan-hhs.pdf [cited 2012 Dec 27].
11. National Quality Forum. NQF endorsed standards for HIV/AIDS [cited 2012 Dec 28]. Available from: URL: http://www.qualityforum.org/QPS
12. Backus LI, Boothroyd DB, Phillips BR, Belperio PS, Halloran JP, Valdiserri RO, et al. National Quality Forum performance measures for HIV/AIDS care: the Department of Veterans Affairs' experience. Arch Intern Med 2010;170:1239-46.
13. Horberg MA, Aberg JA, Cheever LW, Renner P, O'Brian Kaleba E,

Asch SM. Development of national and multiagency HIV care quality measures. Clin Infect Dis 2010;51:732-8.
14. Forsyth A, Yakovchenko V. Identifying common, core indicators to monitor HHS-funded HIV/AIDS prevention, treatment, and care services. 2012 Jul 11 [cited 2013 May 6]. Available from: URL: http://blog.aids.gov/2012/07/identifying-common-core-indicators-to-monitor-hhs-funded-hivaids-prevention-treatment-and-care-services.html
15. Forsyth A, Yakovchenko V. Secretary Sebelius approves indicators for monitoring HHS-funded HIV services. 2012 Aug 8 [cited 2013 May 6]. Available from: URL: http://blog.aids.gov/2012/08/secretary-sebelius-approves-indicators-for-monitoring-hhs-funded-hiv-services.html
16. Gardner EM, McLees MP, Steiner JF, Del Rio C, Burman WJ. The spectrum of engagement in HIV care and its relevance to test-and-treat strategies for prevention of HIV infection. Clin Infect Dis 2011;52:793-800.
17. Centers for Disease Control and Prevention (US). HIV in the United States: the stages of care. Washington: CDC; July 2012. Also available from: URL: http://www.cdc.gov/nchstp/newsroom/2012 [cited 2012 Dec 31].
18. Kidder DP, Wolitski RJ, Campsmith ML, Nakamura GV. Health status, health care use, medication use, and medication adherence among homeless and housed people living with HIV/AIDS. Am J Public Health 2007;97:2238-45.
19. Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, Kumarasamy N, et al. Prevention of HIV-1 infection with early antiretroviral therapy. N Engl J Med 2011;365:493-505.
20. HHS Panel on Antiretroviral Guidelines for Adults and Adolescents, Office of AIDS Research Advisory Council (US). Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents [cited 2013 Jan 7]. Available from: URL: http://aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf
21. Bernstine N, Bendixen A, Holtgrave D, Shubert V. Meeting the treatment and prevention goals of the USA National HIV/AIDS Strategy will require investment in HIV-specific housing supports. Abstract presented at the 19th International AIDS Conference; 2012 Jul 22–27; Washington. Also available from: URL: http://www.iasociety.org/Default.aspx?pageID=12&abstractId=200747091 [cited 2013 Jan 9].
22. Office of Inspector General, Department of Health and Human Services (US). HIV testing in HRSA-funded health center sites January 2013. OEI-06-10-00290 [cited 2013 May 6]. Available from: URL: http://oig.hhs.gov/oei/reports/oei-06-10-00290.asp
23. Branson BM, Handsfield HH, Lampe MA, Janssen RS, Taylor AW, Lyss SB, et al. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. MMWR Recomm Rep 2006;55(RR-14):1-17.
24. Gold M, Dodd AH, Neuman M. Availability of data to measure disparities in leading health indicators at the state and local levels. J Public Health Manag Pract 2008;14 Suppl:S36-44.
25. National Alliance of State and Territorial AIDS Directors. 2011 annual report. Washington: NASTAD; 2012. Also available from: URL: http://www.nastad.org/resources.aspx?searchkey=2011%20annual%20report [cited 2013 May 6].
26. Muller RD. Transforming grants management: a strategic approach to improving performance and reducing burden. J Natl Grants Manag Assoc 2009;17:25-35.

Beyond Measuring What Matters to Managing What Matters: Improving Public Health Quality and Accountability in the U.S. HIV Epidemic Response

Moupali Das, MD, MPH[a,b]

The National HIV/AIDS Strategy (NHAS), released in July 2010, is visionary in its recognition of the instrumental role of public health data in maximizing the U.S. epidemic response to human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS). The ability to measure outcomes along the continuum of HIV care[1,2] is even more significant now that national guidelines[3,4] recommend antiretroviral therapy (ART) for all HIV-infected individuals. This shift demands greater efforts to ensure that all HIV-infected individuals are diagnosed, linked, and engaged in care; begin ART; and achieve durable viral suppression. Increasing the number of people with durable viral suppression is vitally important for individual health with the collateral benefit of reducing HIV transmission.[5–8]

If measuring these outcomes is of such paramount importance, why, then, are we not measuring what matters? In most public health jurisdictions, different federal agencies fund, and different local entities provide, HIV services and address social determinants of health. Numerous independently funded public and private clinical care programs, diverse community-based organizations, and distinct public health divisions provide HIV testing, linkage, partner services, postexposure prophylaxis, and treatment. Every grant from every funder has separate reporting requirements, with distinct, often conflicting indicators for the same steps in the continuum of care. As a result, it is difficult to manage what we measure.

While public health officials have attempted to create a holistic system of prevention and care using diverse funding streams, reporting requirements necessitate obtaining data from distinct entities, with non-interoperable databases or electronic medical record systems, and disparate capacities for reporting. Without valuable local information about rates of testing, diagnosis, linkage, engagement, and retention in care, jurisdictions may struggle to best allocate shrinking resources to areas with the greatest need.

In the article in this issue of *Public Health Reports* titled "Measuring What Matters: Development of Standard HIV Core Indicators Across the U.S. Department of Health and Human Services," Valdiserri et al.[9] describe the significant efforts

[a]San Francisco Department of Public Health, San Francisco, CA

[b]University of California, San Francisco, San Francisco General, Division of HIV/AIDS and Infectious Diseases, San Francisco, CA

Address correspondence to: Moupali Das, MD, MPH, San Francisco Department of Public Health, 25 Van Ness, Ste. 500, San Francisco, CA 94102; tel. 415-437-6204; fax 415-437-4693; e-mail <moupali.das@sfdph.org>.

©2013 Association of Schools and Programs of Public Health

led by the Office of HIV/AIDS and Infectious Disease Policy (OHAIDP) and others within the Department of Health and Human Services (HHS) "to develop common measures and evaluation strategies to assess process and outcomes as they relate to the goals of the NHAS."[10]

The assessment of existing indicators revealed five ways to report a positive HIV diagnosis; three different measures of viral suppression; and two measures each of early diagnosis, linkage to HIV medical care, and engagement in care. After a process guided by shared principles and supported by stakeholder input, OHAIDP ultimately distilled a set of seven core, population-level indicators measuring diagnosis, linkage, retention, ART use, viral suppression, and housing status.[9] Each HHS agency committed to reduce the number and frequency of reporting other indicators. In a corresponding process, the Office of National HIV/AIDS Policy commissioned an Institute of Medicine (IOM) study on indicators and data systems for monitoring HIV care quality.[11]

RECOMMENDATIONS FOR MEASURING WHAT MATTERS

While this study is a considerable first step, the following persistent challenges should also be considered. A local health department may need to report on NHAS goals multiple times a year to the Centers for Disease Control and Prevention, providing interim and annual progress reports for the cooperative agreement, jurisdictional HIV prevention plan, and enhanced comprehensive HIV prevention plan, as well as to the Health Resources and Services Administration for the Ryan White Planning Council plan. A client who receives HIV care, case-management, adherence support, mental health, and substance use services from a medical home clinic may need to recertify eligibility separately for each service every six months, jeopardizing the client's continuity in care.

HHS should consider the following recommendations to improve the ability to measure what truly matters.

Reduce duplication and frequency of reporting
Standardizing data elements, definitions of program activities, forms, and data systems could further reduce duplicate data reporting. A thoughtful effort should be undertaken to align due dates of reports containing similar information to different HHS agencies or parts of the same agency and determine the appropriate periodicity of reports required by different agencies.

Simplify financial reporting and grants administration
Administration burden could be significantly reduced through the removal of high-burden/low-value reporting (e.g., six-month eligibility recertification requirements, given high levels of constancy year after year), the creation of uniform budget codes, increased flexibility for budget reallocation, and efforts to reduce onerous billing requirements.

Encourage data sharing while protecting privacy
A recent Government Accountability Office report, while not specifically focused on HIV, reviewed laws, regulations, and policies and found that facilitating data sharing across human services agencies could enhance eligibility verification, case-management processes, and program accountability, while protecting privacy.[12]

Ensure consistency across HHS agencies
Administration burden could be further reduced through consistent written policies to standardize grants management guidance provided by program officers, contractors, and other staff across all agencies.

RECOMMENDATIONS FOR MANAGING WHAT MATTERS

As acknowledged by Valdiserri et al.,[9] we need to move beyond simply measuring what matters. We must manage what matters by disrupting our current approach to public health program quality and accountability and spurring innovation. Clinical quality improvements, such as the reduction of medication errors or wrong-sided surgeries, required systems-level innovations in organizational culture.[13–15] Similarly, we need to disrupt the way we use surveillance and other data to take public health action and improve population-level health quality. There has been a historical reluctance to use HIV data for public health interventions as is done with other infectious diseases,[16] due to real concerns about protecting the privacy and rights of people living with HIV/AIDS. There are also legal, regulatory, and organizational practices that hinder the use of surveillance data for public health action.

Issue uniform guidelines for using HIV surveillance to promote public health action
Both community and public health attitudes have shifted in favor of using surveillance data for linkage and reengagement.[16–18] Indeed, it has been noted that once the surveillance data are in hand, it is the

failure to use those data for improving public health that must be ethically justified.[19] Several examples exist of thoughtful community- and clinician-endorsed innovations to improve linkage and retention by data sharing beyond traditional surveillance firewalls in San Francisco, New York City, Washington, D.C., Seattle, and Louisiana.[20,21] HHS can empower these local efforts by issuing a uniform set of guidelines to support data sharing across federal partners and with external state, local, and community partners for the purpose of public health action. These guidelines should be informed by U.S. open-government initiatives[22,23] that support data sharing as well as global efforts on personal data security.[24]

Improve the HIV/AIDS surveillance system and other federal data systems to achieve NHAS goals

HHS should implement IOM recommendations to enhance HIV/AIDS surveillance systems by uniformly collecting CD4 cell-count, viral load, and ART data.[11] HHS should direct federal agencies to review and modify their data systems to better accommodate NHAS goals.

Harness trends in health information technology (HIT), big data, and predictive analytic methods

The HHS HIV Open Data Project[25] is a groundbreaking effort supporting the use of data collection interfaces, information management systems, and other HIT. The effective use of HIT, integration of electronic health record data, and exchange of health-related information has the potential to improve continuum-of-care outcomes.[11] Predictive analytic methods using regression analyses of large-scale datasets that combine data from clinical, demographic, insurance, surveillance, and other databases could generate weighted drivers of risk for individuals at the highest risk for failing to link to care or dropping out of care, allowing public health officials to allocate limited resources in a more informed manner than what could be gleaned from individual studies of siloed datasets.[26] HHS should continue its leadership in this area and support innovation in HIV open-data approaches at both federal and local levels.

Evaluate laws, regulations, and policies, and incentivize changes to ensure they are evidence-based, consistent with current guidelines, and do not obstruct public health action

Current laws, regulations, and policies may provide barriers to ART initiation or accessing housing. HHS should conduct a thorough review of its program eligibility requirements to ensure that they do not provide an adverse incentive for HIV/AIDS-related disease progression, as certain key benefits may still be linked to an AIDS diagnosis or low CD4 count.

Synthesize data from different HHS programs and provide local jurisdictions with periodic feedback

HHS, as the collector of reported data, has the responsibility to use all the data collected to not only measure what is happening, but also to meaningfully help the programs manage quality. The collected data should be synthesized and reported back to local jurisdictions periodically to facilitate a culture of continuous public health program quality improvement and to hold both individual programs and the entire system accountable to the NHAS goals.

CONCLUSION

We are in an unparalleled time of advancements in HIV prevention and treatment.[8,27–29] However, significant gaps persist in implementing these strategies.[1,2] The clear leadership demonstrated by OHAIDP and HHS is a vitally important first step to ensuring that we measure what matters. Further innovation will be required to ensure that what we measure gets managed, so that we can significantly improve outcomes for people living with HIV/AIDS and begin to eliminate new HIV transmission in the U.S.

The author alone is responsible for the views expressed in this article, and these views do not necessarily represent the opinions, decisions, or policies of the San Francisco Department of Public Health.

REFERENCES

1. Gardner EM, McLees MP, Steiner JF, Del Rio C, Burman WJ. The spectrum of engagement in HIV care and its relevance to test-and-treat strategies for prevention of HIV infection. Clin Infect Dis 2011;52:793-800.
2. Vital signs: HIV prevention through care and treatment—United States. MMWR Morb Mortal Wkly Rep 2011;60(47):1618-23.
3. Department of Health and Human Services (US), Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents. Rockville (MD): HHS; 2013.
4. Thompson MA, Aberg JA, Hoy JF, Telenti A, Benson C, Cahn P, et al. Antiretroviral treatment of adult HIV infection: 2012 recommendations of the International Antiviral Society-USA panel. JAMA 2012;308:387-402.
5. Wood E, Kerr T, Marshall BD, Li K, Zhang R, Hogg RS, et al. Longitudinal community plasma HIV-1 RNA concentrations and incidence of HIV-1 among injecting drug users: prospective cohort study. BMJ 2009;338:b1649.
6. Granich RM, Gilks CF, Dye C, De Cock KM, Williams BG. Universal voluntary HIV testing with immediate antiretroviral therapy as a strategy for elimination of HIV transmission: a mathematical model. Lancet 2009;373:48-57.

7. Das M, Chu PL, Santos GM, Scheer S, Vittinghoff E, McFarland W, et al. Decreases in community viral load are accompanied by reductions in new HIV infections in San Francisco. PLoS One 2010;5:e11068.
8. Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, Kumarasamy N, et al. Prevention of HIV-1 infection with early antiretroviral therapy. N Engl J Med 2011;365:493-505.
9. Valdiserri RO, Forsyth AD, Yakovchenko V, Koh HK. Measuring what matters: development of standard HIV core indicators across the U.S. Department of Health and Human Services. Public Health Rep 2013;128:352-9.
10. Department of Health and Human Services (US). HHS operational plan: achieving the vision of the National HIV/AIDS Strategy. 2011 [cited 2013 May 22]. Available from: URL: http://www.aids.gov/federal-resources/national-hiv-aids-strategy/nhas-operational-plan-hhs.pdf
11. Institute of Medicine, Committee to Review Data Systems for Monitoring HIV Care. Monitoring HIV care in the United States: indicators and data systems. Washington: National Academies Press; 2012.
12. Government Accountability Office (US). Sustained and coordinated efforts could facilitate data sharing while protecting privacy. Report to Congressional Requesters. February 2013 [cited 2013 May 22]. Available from: URL: http://www.gao.gov/assets/660/652058.pdf
13. Institute of Medicine, Committee on Quality Health Care in America. To err is human: building a safer health system. Washington: National Academies Press; 1999.
14. Institute of Medicine, Committee on Data Standards for Patient Safety. Patient safety: achieving a new standard for care. Washington: National Academies Press; 2003.
15. Institute of Medicine, Committee on Identifying and Preventing Medication Errors. Preventing medication errors: quality chasm series. Washington: National Academies Press; 2006.
16. Frieden TR, Das-Douglas M, Kellerman SE, Henning KJ. Applying public health principles to the HIV epidemic. N Engl J Med 2005;353:2397-402.
17. Fairchild AL, Bayer R. HIV surveillance, public health, and clinical medicine—will the walls come tumbling down? N Engl J Med 2011;365:685-7.
18. Project Inform. Using surveillance and other data to improve HIV care linkage and retention. San Francisco: Project Inform; 2012.
19. Fairchild AL, Gable L, Gostin LO, Bayer R, Sweeney P, Janssen RS. Public goods, private data: HIV and the history, ethics, and uses of identifiable public health information. Public Health Rep 2007;122(Suppl 1):7-15.
20. Herwehe J, Wilbright W, Abrams A, Bergson S, Foxhood J, Kaiser M, et al. Implementation of an innovative, integrated electronic medical record (EMR) and public health information exchange for HIV/AIDS. J Am Med Inform Assoc 2012;19:448-52.
21. Dombrowski JC. How health departments promote retention in HIV care. Medscape News 2012 Sep 19.
22. The White House (US). Open government initiative [cited 2013 May 22]. Available from: URL: http://www.whitehouse.gov/open
23. The White House (US). Open government dashboard [cited 2013 May 22]. Available from: URL: http://www.whitehouse.gov/open/around
24. World Economic Forum and The Boston Consulting Group. Unlocking the value of personal data: from collection to usage. New York: World Economic Forum; 2013.
25. Valdiserri RO. Request for information on guidance for the specification of a secure, online reporting system for streamlining programmatic, fiscal, and other data from DHHS-funded HIV prevention, treatment, and care services grantees. 2012 [cited 2013 May 22]. Available from: URL: http://www.gpo.gov/fdsys/pkg/FR-2012-05-02/html/2012-10591.htm
26. Edelstein P. Emerging directions in analytics. Health Mgmt Tech 2013:16-7. Also available from: URL: http://www.healthmgttech.com/articles/201301/emerging-directions-in-analytics.php [cited 2013 May 22].
27. Grant RM, Lama JR, Anderson PL, McMahan V, Liu AY, Vargas L, et al. Preexposure chemoprophylaxis for HIV prevention in men who have sex with men. N Engl J Med 2010;363:2587-99.
28. Karim SS, Karim QA. Antiretroviral prophylaxis: a defining moment in HIV control. Lancet 2011;378:e23-5.
29. Havlir D, Beyrer C. The beginning of the end of AIDS? N Engl J Med 2012;367:685-7.

The Long and Winding Road: Finding Disaster Preparedness Coordinators in a National Sample of Local Health Departments

Jitka Sammartinova, PhD, MPH[a]
Deborah Glik, ScD[a]
Michael Prelip, DPA, MPH[a]
Michael Stajura, MPP, MPH[a]
Andrea Martel, MEd[a]
David Eisenman, MD, MSHS[b,c]

The Federal Emergency Management Agency's Whole Community framework[1] and the Centers for Disease Control and Prevention's Public Health Preparedness Capabilities[2] emphasize engagement between responding public agencies and community-based organizations (CBOs) as crucial in building community resilience to disasters. In considering an increased focus on cross-agency collaboration, community- and faith-based organizations, as well as other local or regional organizations that work with local health departments (LHDs) to improve community resilience, often view the public health department disaster coordinator as a partner in preparedness and response efforts. Local preparedness coordinators can be a valuable source for disaster readiness, response, recovery plans, and access to local resources.[3] Therefore, it is crucial that these coordinators are easily reachable by the public and CBOs. To measure their accessibility, we examined how easy it was to find coordinator contact information for purposes of a national survey.

FINDING DISASTER PREPAREDNESS COORDINATORS

We conducted a national survey of disaster preparedness coordinators at local public health departments to study their engagement with community- and faith-based organizations in building community resilience. To survey the coordinators, we used the National Association of County and City Health Officials (NACCHO) database of 2,864 LHDs. We applied a probability-proportional-to-size sampling design to generate a stratified random sample of 750 LHDs.

The sample list of LHDs we used did not contain the contact information (e.g., name, telephone number, or e-mail address) of their disaster preparedness coordinators. Therefore, the project coordinator and six graduate student researchers conducted Internet searches of the target sample of LHDs to find their preparedness coordinators' contact information. Next, we confirmed the coordinators' contact information by calling the telephone numbers obtained online. Finally, we telephoned each LHD for which we were unable to obtain

[a]University of California, Los Angeles, Fielding School of Public Health, Department of Community Health Sciences, Los Angeles, CA
[b]University of California, Los Angeles, Center for Public Health and Disasters, Los Angeles, CA
[c]University of California, Los Angeles, David Geffen School of Medicine, Los Angeles, CA
Address correspondence to: Jitka Sammartinova, PhD, MPH, UCLA Fielding School of Public Health, Department of Community Health Sciences, Ste. 26-081, PO Box 951772, Los Angeles, CA 90095-1772; tel. 310-206-8158; fax 310-794-1805; e-mail <jitkasam@ucla.edu>.
©2013 Association of Schools and Programs of Public Health

the disaster coordinator's contact information online. All attempts to identify the preparedness coordinators were made from March to December 2011.

Overall, we identified a website for 88% of the LHDs (660 of 750); contact information for disaster preparedness coordinators was available for only 34% (n=226) of these LHDs (data not shown). Forty-three percent of LHDs in jurisdictions serving <25,000 people (32 of 75) and 44% of LHDs in jurisdictions serving >250,000 people (82 of 187) had coordinators' contact information available online. In contrast, only 23% of LHDs in jurisdictions that serve populations of 25,000–250,000 (112 of 488) (i.e., middle-range jurisdictions) had their coordinators' contact information available online (Table).

Telephone calls were made to all sampled LHDs to confirm the coordinators' contact information. The overall success rate of obtaining this information was 87% (654 of 750). Again, the rate varied among the LHDs stratified by population size. For LHDs in jurisdictions serving <25,000 people, contact information was obtained for 95% of coordinators (71 of 75). For LHDs in jurisdictions serving >250,000 people, contact information was obtained for 96% of coordinators (179 of 187). In contrast, for LHDs in jurisdictions serving populations of 25,000–250,000, contact information was obtained for 83% of coordinators (404 of 488) (Table). Overall, the mean time spent on telephone calls with the LHDs per each successfully obtained disaster coordinator e-mail address was 42 minutes (data not shown).

DISCUSSION

Our findings describe an important barrier to reaching LHD disaster preparedness coordinators. Our results suggest that, overall, online contact information is available for only one-third of coordinators. Community members may have to undertake a significant and persistent effort to obtain this information in more than two-thirds of the counties we surveyed from a stratified random sample of all LHDs in the NACCHO database.

Considering the recent transition in how we conceptualize preparing for disasters in this country toward a larger model characterized by proactive cross-agency collaboration for disaster resilience, this finding is a powerful reminder emphasizing that, to build disaster resilience in communities, there is a crucial need for greater proactive connectedness between CBOs and LHDs.

Although the final success rate of 87% may give an impression that local disaster preparedness coordinators are accessible to the public, succeeding in obtaining the contact information for those 654 coordinators was accomplished through considerable time and effort, requiring a mean of 42 minutes of telephone time. Specifically, one must be willing to make repeated phone calls to health departments, leave multiple messages with phone operators who might not know the department's disaster preparedness personnel, and be prepared to navigate a series of touchtone options during the majority of such calls.

Our results demonstrated significantly different outcomes by LHD strata, in that the information on coordinators in midsize counties was less available online and less available overall compared with the smallest and largest strata. It is possible that the large LHDs have a well-developed, sophisticated organizational structure that includes a clearly defined disaster coordinator position. Based on a qualitative pattern that arose from our conversations with the coordinators, we speculate that it could be easier to identify a disaster preparedness coordinator within small LHDs, if the position exists, because their employees may be likely to know each other. In contrast, the organizational structure of midsize LHDs may make it more difficult to identify a preparedness coordinator because the department might not employ disaster preparedness staff, the LHD staff might be unfamiliar with the disaster coordinator position, or those who fill that role

Table. Success rates of obtaining contact information for disaster preparedness coordinators at LHDs (n=750) in the U.S., March–December 2011

Size of county served	*LHDs in target sample* N *(percent of sample)*	*Disaster preparedness coordinator contact information found online* N *(percent)*	*Disaster preparedness coordinator contact information found by telephone or online* N *(percent)*
<25,000 people	75 (10)	32 (43)	71 (95)
25,000–250,000 people	488 (65)	112 (23)	404 (83)
>250,000 people	187 (25)	82 (44)	179 (96)
Total	750 (100)	226 (30)	654 (87)

LHD = local health department

have other organizational roles and responsibilities for which they are more clearly recognized by staff.

Although we found that contact information for disaster preparedness coordinators in midsize LHDs was significantly less available overall compared with the smallest and largest strata, the range of midsize county populations we adopted for stratification and sampling purposes was rather wide. Therefore, although we analyzed the data in this group as a whole, a range of this width may contain patterns of differential success rates that we were unable to observe.

The primary purpose of our research was a national survey. The barriers to reaching local disaster coordinators were secondary findings. As such, we did not examine why coordinators' contact information was not available online. However, we can speculate. When we spoke with disaster coordinators, they often inquired about the purpose of us collecting their contact information and provided us with their e-mail addresses only after we explained in detail the purpose of our national survey. Further, the coordinators frequently requested that we do not share their contact information with outside parties. Thus, we speculate that some LHDs prefer not to make their coordinators' contact information available online to avoid being readily contacted by the public. Similarly, disaster coordinators may be wary of being targeted for sales and service calls from disaster preparedness and response companies. For example, 28 coordinators provided us with their e-mail addresses only after we promised not to send them marketing materials of any sort. Another reason for their hesitancy to share their e-mail addresses may have been to avoid the added burden of updating such information whenever staffing changes occur. On several occasions, the disaster coordinator that was listed online was not the current staff person responsible for disaster preparedness for the department. Finally, staff with other departmental titles, roles, and responsibilities may also perform disaster preparedness duties. Consequently, their contact information posted online may pertain to their primary role rather than their disaster preparedness responsibilities.

In times of disaster, there may be different ways of reaching out to responding agencies for help. Community members can contact their local emergency management departments for help. However, civilians, especially in times of disaster, might not know what the appropriate responding agency is. In situations such as pandemic preparedness, the LHD clearly appears as the most appropriate first contact. In other contexts, the decision about whom to contact first might be less clear, but community members do not know until they try.

PUBLIC HEALTH IMPLICATIONS

This barrier to reaching local disaster preparedness coordinators poses a potential problem for effective engagement between LHDs and CBOs for disaster readiness and for building community disaster resilience. From the point of view of a CBO, trying to identify someone at the LHD who is responsible for disaster preparedness could be too much work, and the CBO personnel might be inclined to give up in frustration.

These findings suggest a need to reevaluate the quantity of contact information for LHD disaster preparedness coordinators that is currently available on the Internet and, more importantly, to reassess the purpose of making disaster preparedness information available and easy to access by the public.

The work described in this article was supported by the Centers for Disease Control and Prevention (CDC) grant #1P01TP000303-01. The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of CDC.

The work described in this article was approved by the Institutional Review Board of the University of California, Los Angeles.

REFERENCES

1. Department of Homeland Security (US), Federal Emergency Management Agency. FY 2011–2014 strategic plan [cited 2012 Jun 20]. Available from: URL: http://www.fema.gov/fy-2011-2014-strategic-plan
2. Centers for Disease Control and Prevention (US), Office of Public Health Preparedness and Response, Division of State and Local Readiness. Public health preparedness capabilities: national standards for state and local planning. March 2011 [cited 2012 Jun 20]. Available from: URL: http://www.cdc.gov/phpr/capabilities
3. Stajura M, Glik D, Eisenman D, Prelip M, Martel A, Sammartinova J. Perspectives of community- and faith-based organizations about partnering with local health departments for disasters. Int J Environ Res Public Health 2012;9:2293-311.

Improved Outcomes Found After Implementing a Systematic Evaluation and Program Improvement Process for Tuberculosis

Anne Cass, MPH[a]
Tambi Shaw, MPH[b]
Melissa Ehman, MPH[b]
Jan Young, MSN[b]
Jennifer Flood, MD, MPH[b]
Sarah Royce, MD, MPH[b]

ABSTRACT

California's state and local tuberculosis (TB) programs collaborated to develop the Tuberculosis Indicators Project (TIP), a program evaluation and improvement process. In TIP, local and state staff review data, identify program gaps, implement plans to improve local TB program performance, and evaluate outcomes. After 10 years of project implementation, indicator performance changes and patient outcomes were measured. Eighty-seven percent of participating programs showed a performance increase in targeted indicators after three years compared with 57% of comparison groups. Statistically significant performance change was more common in the intervention local health departments (LHDs) than in comparison groups. The most notable performance changes were in the contact investigation and case management indicators. These results indicate that this systematic evaluation and program improvement project was associated with improved LHD TB control performance and may be useful to inform improvement projects in other public health programs.

[a]California Department of Public Health, Center for Infectious Diseases, Division of Communicable Disease Control, Tuberculosis Control Branch, San Diego, CA

[b]California Department of Public Health, Center for Infectious Diseases, Division of Communicable Disease Control, Tuberculosis Control Branch, Richmond, CA

Address correspondence to: Anne Cass, MPH, California Department of Public Health, Center for Infectious Diseases, Division of Communicable Disease Control, Tuberculosis Control Branch, 5353 Mission Center Rd., Ste. 108, San Diego, CA 92018; tel. 619-688-0253; fax 619-688-0281; e-mail <anne.cass@cdph.ca.gov>.

©2013 Association of Schools and Programs of Public Health

In 1998, the California Department of Public Health, Tuberculosis Control Branch (TBCB) sought to enhance its program evaluation and improvement efforts. The evaluation process had two aims: (*1*) to measure the effectiveness of California tuberculosis (TB) control programs in implementing well-established TB control guidelines and ensuring positive patient and public health outcomes and (*2*) to focus interventions where gaps were identified. From 1998 to 2000, the TBCB worked closely with local health departments (LHDs) to design TB program performance indicators and a collaborative process for the state and local TB programs to use the indicators. The resulting evaluation and program improvement initiative, called the Tuberculosis Indicators Project (TIP), was launched in 2000.

In this article, we describe the implementation of an evaluation framework in multiple high-morbidity local TB control programs in California. We also quantify the program performance changes associated with TIP and examine why these changes might have occurred.

BACKGROUND

After decades of decline in the number of reported cases of TB in the United States, there was a national resurgence of TB in the early 1990s.[1] Since then, the number of reported TB cases has steadily decreased, greatly due to the development of effective interventions enabled by increased resources.[2] California reports the highest TB morbidity of any state in the U.S., with more than 2,300 active TB cases annually, and one of the highest case rates at more than six cases per 100,000 people.[3]

The California state TB program, the lead agency for TB control, provides funding, consultation, and oversight to LHDs throughout the state. The 61 LHDs in California conduct TB surveillance, provide or oversee clinical and case management for TB patients, and conduct TB contact investigations. Control of TB in California is complicated by the fact that more than one-third of TB cases receive all of their clinical care in the private sector and more than half of the cases receive at least some of their care from private providers;[4] however, LHDs are responsible for ensuring the quality of care provided for all TB cases. Effective communication and collaboration between public and private agencies are required for performance objectives to be met.

In 2000, California initiated a structured, collaborative process for using TB indicators to improve performance. Nineteen LHDs with at least 30 TB cases per year participated in the project. Collectively, these LHDs reported 93% of California's TB cases.

Through collaboration between local and state TB programs, a set of TB control indicators was developed. To improve indicator performance, a systematic process for selecting and evaluating interventions and measuring outcomes was designed. The TIP process fosters state and local collaboration in developing, implementing, and evaluating programmatic interventions designed to improve performance on targeted indicators. Figure 1 presents a comprehensive list of the TIP indicators and Figure 2 describes the steps of the improvement cycle. State and local TB teams work together to review data, select interventions, and evaluate outcomes. The interdisciplinary state teams include a program consultant and an epidemiologist, with fiscal, physician, and administrative support when needed. The local team typically includes the TB controller, program manager, nursing and allied health professional supervisors and staff, and an epidemiologist where available. Figure 3 specifies the local and state roles in TIP implementation.

New TIP cycles are launched when LHD and TBCB staff indicate readiness to begin the multiyear program improvement process. The state and local teams initially meet to review the indicator data and select an indicator for intervention. Once the indicator is selected, staff members identify possible factors contributing to underperformance and then develop a performance improvement plan. The plan is revisited at regular intervals to monitor progress and to assess short-term impact. The long-term outcomes are measured when data become available. Each program improvement cycle averages two years and includes multiple in-person meetings between the state and local TB program staff.

METHODS

In this retrospective observational analysis, the study period was 2000–2010. We assessed all TB cases reported during this time frame in the 19 California TIP LHDs. We compared outcomes of cases from California LHDs implementing interventions to improve performance on a specific indicator through TIP with those of cases from California LHDs participating in TIP but not targeting the specific indicator for improvement.

Data sources

Indicators measuring TB control activities were calculated using surveillance data sources for TB cases[5] and contacts.[6] Case reports are submitted to the state

TB program for each verified case of TB disease. The case reports contain a broad range of data on patient demographic and clinical characteristics and treatment outcomes. Contact reports contain aggregate information for contacts identified and evaluated for TB and treated for latent TB infection (LTBI).

Analysis

We identified LHDs implementing interventions as part of TIP (hereafter, intervention LHDs) with at least three years of available data during and after intervention implementation. Data from the year immediately prior to the intervention period served as

Figure 1. Tuberculosis control performance indicators used in program improvement cycles: California Tuberculosis Indicators Project, 2000–2010

Goals and performance indicators	*Indicator*
Goal A: Ensure sufficient resources are available and effectively used to support a public health infrastructure capable of controlling and eliminating TB	
A1. Program capacity	Demonstrated capacity (organization, staffing, resources, and facilities) to carry out the core components of a TB control program
Goal B: Ensure early identification and reporting of all people with TB	
B1. TB case rate	TB case rate per 100,000 population
B2. Timely reporting	Proportion of verified TB cases reported to the LHD within one working day of treatment start date
B3. Complete reporting	Proportion of cases with complete data on key variables (e.g., homelessness, drug use, and excess alcohol use) for TB
B4. Culture identification	Proportion of pulmonary or laryngeal TB cases >12 years of age with sputum culture obtained
B5. Timely evaluation of people with immigrant TB notification[a]	Proportion of people with immigrant TB notification whose evaluation for TB disease/infection is completed within 60 days of LHD receiving the notification
Goal C: Ensure timely completion of appropriate therapy for all people with TB	
C1. Recommended initial therapy	Proportion of TB cases started on recommended four-drug regimen
C2. Timely treatment initiation	Proportion of sputum smear-positive pulmonary or laryngeal TB cases initiating treatment in <7 days from specimen collection
C3. Culture conversion	Proportion of sputum culture-positive TB cases with documented conversion to sputum culture-negative within 60 days of treatment initiation
C4-A. Appropriate DOT	Proportion of TB cases for whom DOT is recommended who receive DOT throughout the course of treatment
C4-B. Inappropriate SAT	Proportion of TB cases for whom DOT is recommended who receive SAT throughout the course of treatment
C5. Timely completion of therapy	Proportion of TB cases who complete treatment in ≤12 months
C6. Not defaulting from treatment	Proportion of TB cases who do not default prior to completing treatment
C7. Moved cases completing treatment	Proportion of TB cases moving during treatment who completed treatment in ≤12 months
Goal D: Ensure contacts to a person with infectious TB are promptly identified, examined, and, if appropriate, complete treatment for LTBI	
D1. Contact identification	Proportion of sputum smear-positive cases with at least one contact identified
D2. Contact evaluation	Proportion of identified contacts to sputum smear-positive cases who complete evaluation for TB infection or disease
D3. Contact LTBI treatment initiation	Proportion of infected contacts to pulmonary cases started on treatment for LTBI
D4. Contact LTBI treatment completion	Proportion of infected contacts to pulmonary cases started on treatment for LTBI who complete treatment
Goal SE: Reduce the occurrence of sentinel events	
SE1. Pediatric TB cases	Proportion of TB cases in children 0–4 years of age
SE2. TB deaths	Proportion of people who die with TB disease

[a]Indicator not implemented due to data inaccessibility

TB = tuberculosis

LHD = local health department

DOT = directly observed therapy

SAT = self-administered therapy

LTBI = latent tuberculosis infection

Figure 2. Key steps in a tuberculosis control program improvement cycle: California Tuberculosis Indicators Project, 2000–2010

TIP steps	*Activities*
Perform initial assessment	• Perform infrastructure assessment to determine local capacity to meet TB control standards. • Perform initial review of indicator data comparing local program performance with statewide performance and state/national objectives. • Select indicators for additional analyses.
Analyze and plan	• Perform chart reviews, additional stratifications of surveillance data, and key informant interviews to identify possible reasons for suboptimal indicator performance. • Select indicator(s) to target for intervention. • Develop contributing factors diagram that depicts factors hindering optimal program performance.
Develop and implement performance improvement plan	• Develop a performance improvement plan for targeted indicator(s). • Implement performance improvement plan.
Evaluate	• Conduct short- and long-term evaluation of the performance improvement plan: ∘ Review and update the performance improvement plan at regular intervals. ∘ Review outcome data. ∘ Perform written evaluations and key informant interviews to obtain feedback from local and state staff.
Implement next TIP cycle	• When local and state staff are ready, implement next TIP cycle.

TIP = Tuberculosis Indicators Project

TB = tuberculosis

the baseline year. Three years was chosen for the time interval to allow for gradual implementation of more complex interventions; it was also sufficient to observe performance changes related to the intervention. We compared cases or contacts in each intervention LHD for an indicator with pooled cases or contacts from all other TIP LHDs that were not implementing interventions for that same indicator during that same three-year period. Baseline and follow-up years were selected based upon the year TIP interventions began; therefore, they differed among LHDs. Separate comparisons were made for LHDs that implemented interventions for the same indicator but during different time periods to account for differences in secular trends in indicator performance during different time periods. We used the Chi-square test of proportions to assess statistical significance of performance change between intervention and comparison groups of cases or contacts, comparing aggregate baseline and three-year performance between the two groups for each indicator and time period. Within indicators, we stratified by baseline year to control for changes in baselines over time. When more than one LHD implemented interventions for a given indicator in the same time period, we analyzed results for cases or contacts in each intervention LHD.

We calculated the absolute percentage change in performance between baseline and year three of performance improvement plan implementation for each intervention and comparison group. The performance change was designated as positive when the change was in the direction of the desired outcome. For most indicators, the desired change was a numerical increase in the indicator result. However, for two TIP indicators,

Figure 3. Local and state roles in a tuberculosis control program improvement cycle: California Tuberculosis Indicators Project, 2000–2010

Agency	*Roles*
Local health department	1) Select indicator(s) to target for improvement. 2) Set realistic local performance objectives for the targeted indicator(s). 3) Identify the factors contributing to suboptimal performance in the targeted indicator(s). 4) Develop and implement interventions to facilitate achievement of the local performance objective.
State TB control branch	1) Provide Web-based indicator reports. 2) Serve as evaluation consultants and facilitators, providing guidance, tools, and technical assistance throughout the process.

TB = tuberculosis

Inappropriate Self-Administered Therapy (SAT) and Pediatric TB Cases, a decrease in the indicator result was the desirable outcome, and numerical decreases were shown as a positive result.

OUTCOMES

From 2000 to 2007, 15 TIP LHDs developed 29 performance improvement plans for 12 separate indicators. By the end of the study period in 2010, three-year outcomes were available for 25 plans. One plan was omitted from outcome analysis because the baseline performance was zero and relative change could not be calculated. We analyzed the outcomes of 24 performance improvement plans.

The number of cases or contacts in LHDs implementing performance improvement plans ranged from 14 to 1,275. The number of cases or contacts in each comparison group ranged from 670 to 10,717, according to the time period and indicator.

Results of the performance change analysis are shown in the Table. We observed improved outcomes following three years of implementation in 87% (21/24) of the performance improvement plans, while 57% (12/21) of the comparison groups saw improvement during the same time period. Statistically significant performance change at the $p<0.05$ level was more common in the intervention LHDs than in the comparison groups. Following implementation of performance improvement plans, 50% (12/24) of the intervention LHD groups showed significant improvement, with no significant declines in performance. Among comparison groups, 33% (7/21) showed significant improvement while 10% (2/21) significantly worsened.

Structured feedback from both LHD and state staff participating in the project indicated that TIP provided a forum for improved collaboration between the two entities, and LHD staff expressed satisfaction with both the TIP process and outcomes.

Amenability to intervention

The difference in performance change between intervention and comparison groups was shown most clearly for the Contact Evaluation indicator, which measures the percentage of close contacts to infectious TB cases who are fully evaluated for TB disease and infection. For this indicator, performance in all four intervention LHDs significantly improved (range: 6%–26%, all $p<0.005$), while performance in two of the three comparison groups significantly declined (by −2% and −3%, both $p<0.005$) (Table).

Two other indicators of note concerned the provision of directly observed therapy (DOT) to patients with special indications for ensuring treatment completion, such as those with drug-resistant TB. Three LHDs focused on ensuring that high-priority patients received all treatment via DOT, and two aimed to prevent high-priority patients from receiving SAT throughout treatment. All five intervention LHDs showed improved performance compared with baseline (range: 1%–70%). Three of the five comparison groups showed improvement (range: 3%–14%) and the remaining two comparison groups showed performance decreases (−1% and −3%).

Another indicator that showed significant improvement after TIP implementation was Contact LTBI Treatment Initiation. The LHD that targeted this indicator improved 34% ($p<0.005$) while the comparison group declined by 1% ($p=0.125$).

The other seven indicators showed improvement in intervention LHDs after implementing 11 of 14 performance improvement plans. Eight of the corresponding comparison groups also showed performance increases, with one decline and three instances of no change.

Interventions implemented to improve performance

Figure 4 shows seven categories of interventions included in TIP performance improvement plans. The Appropriate DOT/Inappropriate SAT indicators were combined in Figure 4 because the interventions for the two indicators had the same goal: to increase the use of DOT in high-priority patients. While there was a wide range in the number of intervention types implemented by LHDs to improve indicator performance, the most common interventions were the use of internal quality assurance processes, the development of new forms and LHD processes, and the implementation of outreach and education for private medical doctors (PMDs). Nearly half of all indicators had reporting issues that were identified and addressed through the TIP process.

LESSONS LEARNED

Eighty-seven percent of LHDs targeting an indicator for improvement showed performance improvement after implementing interventions using the TIP process. In contrast, 57% of the comparison groups saw improved performance for those indicators.

Of all of the indicators, the most notable improvement was seen in the Contact Evaluation indicator. All four intervention LHDs saw statistically significant performance increases while two of the three comparison groups had statistically significant performance decreases. Interventions cited by LHD key informants

as contributing to their performance change included prioritization of contacts, staff training, development of educational materials and tools, and efforts to improve data quality. Also, the performance improvement plans for the Contact Evaluation indicator included interventions from all seven intervention categories, and it is possible that the breadth of interventions contributed to the observed performance improvements.

Ensuring that patients adhere to and complete an appropriate treatment regimen is a key responsibility of TB control programs.[7] DOT is used to ensure that TB patients are taking their required medications until cure.[8] Improvement was noted in all five LHDs targeting the two indicators focused on DOT (i.e., Appropriate DOT and Inappropriate SAT), with one LHD observing a performance change from 29% to 89%. Similar to the Contact Evaluation indicator, the DOT/SAT performance improvement plans included a wide range of intervention types, which also may have contributed to the improved outcomes.

Monitoring of sputum cultures until conversion is performed to ensure that patients are responding

Table. Performance change in local tuberculosis control programs after implementation of program improvement activities, by indicator: California Tuberculosis Indicators Project, 2000–2010

		Performance		*Year 3 vs. baseline*	
Indicator	*LHD or comparison group[a] (baseline year)*	*Baseline year Percent (N)[b]*	*Year 3 of interventions Percent (N)*	*Absolute performance change[c]*	*P-value[d]*
Timely Reporting	A (2001)	64 (192)	76 (135)	+12	0.02
	K (2001)	84 (50)	89 (63)	+5	0.45
	Comparison (2001)	84 (2,781)	89 (2,525)	+5	<0.01
Complete Reporting	I (2001)	83 (126)	99 (156)	+16	<0.01
	Comparison (2001)	96 (2,935)	97 (2,613)	+1	0.26
Culture Conversion ≤60 Days	B (1999)	56 (45)	80 (35)	+24	0.02
	Comparison (1999)	64 (1,495)	65 (1,313)	+1	0.89
	D (2000)	81 (21)	75 (16)	−6	0.66
	J (2000)	68 (184)	74 (175)	+6	0.27
	Comparison (2000)	56 (1,445)	74 (1,306)	+18	<0.01
Appropriate Directly Observed Therapy	B (1999)	11 (27)	81 (16)	+70	<0.01
	Comparison (1999)	63 (967)	77 (761)	+14	<0.01
	A (2001)	29 (59)	89 (28)	+60	<0.01
	Comparison (2001)	75 (851)	72 (767)	−3	0.15
	E (2003)	28 (18)	29 (14)	+1	0.96
	Comparison (2003)	73 (799)	72 (597)	−1	0.75
Inappropriate Self-Administered Therapy	L (2001)	31 (95)	15 (104)	+16	0.01
	Comparison (2001)	16 (1,745)	11 (1,538)	+5	<0.01
	B (2004)	22 (32)	5 (22)	+17	0.08
	Comparison (2004)	11 (1,538)	8 (1,306)	+3	<0.01
Timely Completion of Therapy	B (1999)	76 (89)	89 (57)	+13	<0.05
	Comparison (1999)	80 (2,602)	81 (2,312)	+1	0.29
	H (2000)	75 (56)	84 (63)	+9	0.23
	Comparison (2000)	80 (2,377)	80 (2,322)	NC	0.51
	A (2001)	84 (177)	86 (122)	+2	0.56
	Comparison (2001)	81 (2,412)	81 (2,228)	NC	0.89
Contact Identification	M (2006)	94 (365)	91 (274)	−3	0.13
	Comparison (2006)	90 (670)	95 (603)	+5	<0.01
Contact Evaluation	J (2002)	83 (845)	89 (714)	+6	<0.01
	C (2002)	57 (329)	78 (412)	+21	<0.01
	Comparison (2002)	92 (9,451)	90 (9,736)	−2	<0.01
	I (2003)	76 (269)	90 (1,275)	+14	<0.01
	Comparison (2003)	90 (10,717)	87 (8,467)	−3	<0.01
	N (2006)	49 (491)	75 (685)	+26	<0.01
	Comparison (2006)	87 (8,467)	89 (9,757)	+2	<0.01

continued on p. 373

Table (continued). Performance change in local tuberculosis control programs after implementation of program improvement activities, by indicator: California Tuberculosis Indicators Project, 2000–2010

		Performance		Year 3 vs. baseline	
Indicator	*LHD or comparison group[a] (baseline year)*	*Baseline year Percent (N)[b]*	*Year 3 of interventions Percent (N)*	*Absolute performance change[c]*	*P-value[d]*
Contact LTBI Treatment Initiation	O (2006)	56 (68)	90 (97)	+34	<0.01
	Comparison (2006)	62 (3,652)	61 (3,146)	−1	0.13
Contact LTBI Treatment Completion	G (2003)	71 (245)	69 (183)	−2	0.56
	Comparison (2003)	60 (2,907)	57 (2,135)	−3	0.08
Pediatric TB Cases	B (1999)	8 (97)	2 (69)	+6.8	0.06
	Comparison (1999)	4 (2,868)	3 (2,578)	+0.6	0.24
	A (2001)	2 (196)	1 (143)	+0.8	0.48
	Comparison (2001)	4 (2,754)	4 (2,548)	NC	0.98
	F (2003)	6 (65)	<1 (39)	+6.2	0.11
	Comparison (2003)	4 (2,654)	4 (2,394)	+0.5	0.31

[a]A–O = TIP LHDS (coded); comparison = aggregate cases or contacts across all TIP LHDS not developing interventions for a given TIP indicator during the specified time period

[b]Baseline year is the year immediately prior to the intervention period, and varies by LHD.

[c]To consistently represent positive change as change toward a desirable outcome, performance change for indicators measuring cases with an undesirable outcome (e.g., Inappropriate Self-Administered Therapy and Pediatric TB Cases) is calculated as (baseline [pre-TIP] performance percent – Year 3 [post-TIP] performance percent).

[d]For Chi-square test of proportions

LHD = local health department

NC = no change

LTBI = latent tuberculosis infection

TB = tuberculosis

TIP = Tuberculosis Indicators Project

to therapy and to determine the appropriate length of treatment.[9] Improvement was seen in two of three performance improvement plans targeting the Culture Conversion indicator. Local TB program staff reported that a review of culture status at case conferences, the development of a tracking tool, the identification of alternate means for sputum specimen collection, and the development of a clinic protocol all likely contributed to performance improvement.

Both health departments and PMDs provide care for active TB cases and their contacts. While several performance improvement plans included interventions directed toward PMDs, LHDs targeting the Contact LTBI Treatment Initiation, Timely Reporting, and Complete Reporting indicators all reported that their improved communication with PMDs was key to performance change. All three of these indicators showed performance improvement after TIP implementation. Public health budget reductions and U.S. health-care reform will further increase the need for LHDs to effectively work with the private health-care delivery system.

Contact Identification, Contact LTBI Treatment Completion, and Pediatric TB Cases indicators were the least likely to show significant improvement in either the intervention or comparison groups. Contact identification can be challenging, as TB patients are often reluctant to share contact information due to disease-associated stigma, embarrassment, or involvement in illegal activities. Ensuring completion of treatment for both TB cases and contacts also presents a significant challenge for TB control practitioners.[9,10] Treatment is lengthy and must be provided even when patients do not feel sick. Patients with TB disease or infection often have competing priorities in their lives, including substance abuse and/or homelessness, which make adhering to a treatment regimen difficult.[11] Multiple factors contribute to the development of pediatric TB, and missed opportunities for TB prevention in this population are well-documented.[12,13]

As mentioned previously, the most common interventions across all LHDs and indicators were the use of internal quality assurance processes such as case conferences, the development of new forms and LHD processes, and outreach and education for PMDs. Case conferences are recommended for identifying and

Figure 4. Common themes among program improvement interventions, by indicator: California Tuberculosis Indicators Project, 2000–2010

Indicator (number of performance improvement plans)	*Establish internal quality assurance processes*	*Establish other internal processes*	*Create and use forms and protocols*	*Train staff*	*Fix reporting issues*	*Educate patients*	*Educate private medical doctors*	*Number of intervention types*
Timely Reporting (2)	X				X		X	3
Complete Reporting (1)	X	X	X	X				4
Culture Conversion ≤60 Days (3)	X	X	X	X	X	X	X	7
Appropriate Directly Observed Therapy/ Inappropriate Self-Administered Therapy (5)	X	X	X	X	X	X	X	7
Timely Completion of Therapy (3)	X	X	X		X		X	5
Contact Identification (1)				X				1
Contact Evaluation (4)	X	X	X	X	X	X	X	7
Contact LTBI Treatment Initiation (1)	X	X	X	X		X	X	6
Contact LTBI Treatment Completion (1)	X	X	X	X		X	X	6
Pediatric TB cases (3)	X	X	X	X		X	X	6

LTBI = latent tuberculosis infection

TB = tuberculosis

resolving programmatic issues in TB control, as they provide a forum for monitoring clinical, case management, and contact investigation processes and outcomes.[14,15] In TIP, state staff provide tools and technical assistance to help LHDs implement case conferences. Cohort review, another program improvement strategy, has recently been adopted by several California LHDs but was not included as an intervention in any of the TIP performance improvement plans included in this study. LHDs can implement new forms and processes without significant resources but with a significant impact. After a successful TIP intervention has been implemented, state and local staff are able to share the tool and/or process with other LHDs. An example of this information sharing is the development of a fact sheet on state letterhead that LHDs can use to educate PMDs about the need for DOT in high-risk patients.

Several performance improvement plans contained interventions to correct reporting issues identified during the TIP process. According to LHD management staff, five indicators likely improved, at least in part, because of improved data quality.

Limitations

Our analysis was subject to several limitations. Other factors outside of interventions driven by TIP that could have impacted performance were not systematically evaluated, such as changes in local funding, staffing, or concurrent non-TIP interventions. For some indicators, such as Pediatric TB Cases, small numbers of cases for analysis may have hampered our ability to evaluate improvement using statistical significance tests. Small numbers were also a limitation in comparing the small case or contact numbers of the intervention LHDs with larger pooled comparison groups of cases or contacts; there was greater power to detect a statistically significant change for the comparison groups.

The variation among LHDs that participated in TIP also may hinder generalizability. Additionally, state and local TB program staffing levels and budgets have diminished since the study period began. Thus, it is not known if these results are reproducible at the present time, given current resources.

When LHDs implemented interventions to improve performance on a specific indicator, such actions may have had a positive impact on other TB practice areas. For example, implementing case conferencing to improve DOT might also improve culture conversion. This improvement might have affected performance in indicators not specifically targeted and could account for some of the program performance improvements that were seen in the comparison groups. Also, a review of indicator data occasionally resulted in LHDs initiating interventions to improve indicator performance without developing a formal performance improvement plan.

CONCLUSIONS

The results of our evaluation suggest that this systematic improvement and evaluation project was associated with improvements in TB control performance indicators in California. Findings include improved TB control outcomes after implementing 21 of 24 performance improvement plans, and a higher proportion of statistically significant improvements in intervention groups vs. comparison groups.

In addition to providing California with a process to use data to guide TB program performance efforts, TIP implementation has also contributed to improved data quality and increased collaboration between the state TBCB and LHDs. While the concept of an indicator set has already been replicated nationally by the Centers for Disease Control and Prevention as the National TB Indicators Project,[16] the systematic improvement process used in TIP could also be replicated by other public health programs. In an era of declining public health resources[17] and loss of the infrastructure necessary for key public health activities,[18] interventions such as TIP can help ensure that limited resources are used effectively for program improvement.

Further research is needed to increase our understanding of how inputs such as funding, staffing, and program organization impact program performance. Data are also needed to strengthen the evidence base for TB program interventions.

The authors thank local health department staff for participating in the Tuberculosis Indicators Project, Katherine Lamba and Alex Golden for manuscript preparation, and Dr. Julie Higashi and Michael Carson for manuscript review.

This article was exempt from Institutional Review Board approval because the California Department of Public Health, Division of Communicable Disease Control collects surveillance data and performs analyses as a mandate for public health. This article was deemed nonresearch, as it represents routine evaluation work using aggregate surveillance and programmatic data not linked to specific patients.

REFERENCES

1. Cantwell MF, Snider DE Jr, Cauthen GM, Onorato IM. Epidemiology of tuberculosis in the United States, 1985 through 1992. JAMA 1994;272:535-9.
2. McKenna MT, McCray E, Jones JL, Onorato IM, Castro KG. The fall after the rise: tuberculosis in the United States, 1991 through 1994. Am J Public Health 1998;88:1059-63.
3. Centers for Disease Control and Prevention (US). Reported tuberculosis in the United States, 2010. Atlanta: CDC; 2011.
4. Westenhouse J, Cueva C, Johnson L, Kanowitz S, Robsky K. Report on tuberculosis in California, 2011. Richmond (CA): California

Department of Public Health; October 2012. Also available from: URL: http://www.cdph.ca.gov/data/statistics/Documents/TBCB_Report_2011.pdf [cited 2013 Mar 21].
5. Centers for Disease Control and Prevention (US). Report of verified case of tuberculosis (RVCT). Atlanta: CDC; 2009.
6. California Department of Public Health. Aggregate reports for tuberculosis program evaluation: follow-up and treatment for contacts to tuberculosis cases: preliminary report. Sacramento (CA): California Health and Human Services Agency; 2007.
7. Essential components of a tuberculosis prevention and control program. Recommendations of the Advisory Council for the Elimination of Tuberculosis. MMWR Recomm Rep 1995;44(RR-11):1-16.
8. Blumberg HM, Burman WJ, Chaisson RE, Daley CL, Etkind SC, Friedman LN, et al. American Thoracic Society/Centers for Disease Control and Prevention/Infectious Diseases Society of America: treatment of tuberculosis. Am J Respir Crit Care Med 2003;167:603-62.
9. Taylor Z, Nolan CM, Blumberg HM. Controlling tuberculosis in the United States. Recommendations from the American Thoracic Society, CDC, and the Infectious Diseases Society of America [published erratum appears in MMWR Morb Mortal Wkly Rep 2005;54(45):1161]. MMWR Recomm Rep 2005;54(RR-12):1-81.
10. Targeted tuberculin testing and treatment of latent tuberculosis infection. Am J Respir Crit Care Med 2000;161(4 Pt 2):S221-47.
11. Sumartojo E. When tuberculosis treatment fails. A social behavioral account of patient adherence. Am Rev Respir Dis 1993;147:1311-20.
12. Lobato MN, Mohle-Boetani JC, Royce SE. Missed opportunities for preventing tuberculosis among children younger than five years of age. Pediatrics 2000;106:E75.
13. Lobato MN, Sun SJ, Moonan PK, Weis SE, Saiman L, Reichard AA, et al. Underuse of effective measures to prevent and manage pediatric tuberculosis in the United States. Arch Pediatr Adolesc Med 2008;162:426-31.
14. California Tuberculosis Controllers Association, California Department of Public Health. Guidelines for the investigation of contacts of persons with infectious tuberculosis. Oakland (CA): California Tuberculosis Controllers Association; 2009.
15. New Jersey Medical School National Tuberculosis Center. Planning and implementing the TB Case Management Conference: a unique opportunity for networking, peer support, and ongoing training. 2004 [cited 2012 May 10]. Available from: URL: http://www.umdnj.edu/globaltb/downloads/planning&implementing/TBCaseMGT.pdf
16. Hughes S, Sodt D, Young K, Jereb J, Pratt R, Navin T, et al. Monitoring tuberculosis programs—National Tuberculosis Indicator Project, United States, 2002–2008. MMWR Morb Mortal Wkly Rep 2010;59(10):295-8.
17. Levi J, Laurent R, Segal L, Vinter S. Shortchanging America's health: a state-by-state look at how public health dollars are spent and key state health facts. Washington: Robert Wood Johnson Foundation; 2010. Also available from: URL: http://healthyamericans.org/assets/files/TFAH2010Shortchanging05.pdf [cited 2012 May 10].
18. Levi J, Kaiman S, Kaiman S, Segal L. Blueprint for a healthier America: modernizing the federal public health system to focus on prevention and preparedness. Washington: Robert Wood Johnson Foundation; 2008. Also available from: URL: http://healthyamericans.org/assets/files/Blueprint.pdf [cited 2012 May 10].

From Newborn Screening to Population Health Research: Implementation of the Michigan BioTrust for Health

Carrie Langbo, MS, CGC[a]
Janice Bach, MS, CGC[a]
Mary Kleyn, MS[a]
Frances Pouch Downes, DrPH[b]

ABSTRACT

In June 2009, the Michigan Department of Community Health launched the Michigan BioTrust for Health to improve preservation and utility of residual dried blood spots from newborn screening (NBS) for biomedical research while maintaining public support and integrity of NBS. In this article, we chronicle implementation of the BioTrust and document its impact on NBS. Overall, the percentage of new parents who consent to possible future research use of their children's dried blood spots through the BioTrust has remained consistent with previous public opinion surveys. No significant increase in refusal of NBS has been observed despite increased publicity. There was, however, a slight increase in requests to destroy samples following completion of NBS, indicating readily accessible opt-out information. Given adequate training and cooperation of birthing hospital staff, as well as outreach education for parents and health-care providers, we conclude it is possible to implement a biobanking initiative without adversely impacting NBS.

[a]Michigan Department of Community Health, Bureau of Disease Control, Prevention and Epidemiology, Lansing, MI

[b]Michigan State University, Program in Public Health and BioMedical Laboratory Diagnostics Program, East Lansing, MI

Address correspondence to: Carrie Langbo, MS, CGC, Michigan Department of Community Health, Bureau of Disease Control, Prevention and Epidemiology, 201 Townsend St., PO Box 30195, Lansing, MI 48909; tel. 517-335-6497; fax 517-335-9790; e-mail <langboc@michigan.gov>.

©2013 Association of Schools and Programs of Public Health

Newborn screening (NBS) for phenylketonuria marked the advent of a vital public health program leading to the identification and treatment of more than 4,691 Michigan newborns with serious disorders since 1965. Recently, state NBS programs have grappled with residual dried blood spot storage and research, but Michigan first began the stepwise process of examining these issues more than two decades ago (Figure 1). In 1987, the Michigan Department of Community Health (MDCH) implemented a policy of storing residual dried blood spots for 21.5 years, after receiving legal advice on appropriate retention periods. In 1999, the Governor's Commission on Genetic Privacy and Progress recommended that residual dried blood spots be retained indefinitely because of their potential utility in health research.[1] As a result, the Michigan Legislature amended the public health code in 2000 to allow the use of residual dried blood spots during the retention period, as long as human subjects and privacy were protected.[2] Language directing MDCH to set the retention schedule was included in the law, and the current laboratory policy of indefinite storage was established in 2008.[3]

While Michigan's public health code established the foundation for storage and research use of residual dried blood spots, numerous challenges had to be addressed to ensure adequate community education and public support. Historically, parents were advised of retention practices and potential research use of residual dried blood spots through a paragraph in the Michigan NBS brochure distributed at the time of delivery. Concerns developed about whether parents read the brochure or were truly informed of options. Policy questions also arose on how best to balance individual autonomy and public benefit from dried blood spot research, particularly if demand for use increased. Therefore, MDCH undertook a process to formalize dried blood spot storage and use policies through creation of the Michigan BioTrust for Health (hereafter, BioTrust), drawing heavily from stakeholder input. The original aims of the BioTrust were to improve the preservation and utility of dried blood spots through more optimal storage conditions and to promote their use for biomedical and public health research while maintaining the public support and integrity of Michigan NBS.

BIOTRUST DEVELOPMENT

Planning

Before developing the BioTrust, MDCH used multiple methods to gauge interest in dried blood spot research

Figure 1. Michigan BioTrust for Health timeline

Year	*Action*
1987	After receiving legal advice, MDCH implements a 21.5-year retention schedule for dried blood spots.
1999	Governor's Commission on Genetic Privacy and Progress issues recommendation to retain blood spots indefinitely.
2000	Michigan Legislature amends Michigan Public Health Code to allow dried blood spot research.
2006	MDCH convenes the Michigan Blood Spot Symposium.
2007	MDCH develops white paper. MDCH convenes stakeholders meeting. MDCH and partners establish steering committee and workgroups.
2008	MDCH revises blood spot retention policy. MDCH and partners initiate community engagement activities (i.e., focus groups, BRFS, and online survey). MDCH and partners develop business plan. MDCH convenes legal roundtable. MDCH IRB reviews and approves parental consent policy. Michigan Neonatal Biobank incorporates as a 501(c)(3) nonprofit organization.
2009	MDCH launches the Michigan BioTrust for Health. MDCH convenes the BioTrust Community Values Advisory Board. The Michigan Neonatal Biobank establishes a board of directors.
2010	MDCH establishes the BioTrust Scientific Advisory Board. MDCH launches a community, health professional, and hospital education initiative. MDCH implements the BioTrust parental consent process.
2011	MDCH ensures that ongoing community, health professional, and hospital education remains a priority.

MDCH = Michigan Department of Community Health

BRFS = Behavioral Risk Factor Survey

IRB = Institutional Review Board

within the scientific community and to assess public acceptance, including literature reviews, stakeholder meetings, focus groups, surveys, and discussions with experts and advocacy groups. Researchers representing Michigan's three major research universities were brought together for a Blood Spot Symposium in 2006 and affirmed sufficient interest in dried blood spot research to warrant further investigations. In 2007, MDCH convened stakeholders to assist with the formation of a steering committee and three working groups charged with developing a business plan, identifying research priorities, and recommending community engagement methods.

Throughout the planning process, the steering committee and workgroups emphasized privacy, community perceptions, and the need for appropriate research guidelines. MDCH added an accessible opt-out process to the Michigan NBS website and, in 2008, implemented a plan to solicit opinions from focus group participants derived from diverse communities, especially those representing the "general public," who might have concerns as stakeholders in the BioTrust. Neutral facilitators led 10 focus group discussions addressing key questions surrounding the use of dried blood spots, with participants completing opinion surveys before and after discussion.[4] MDCH staff provided numerous informational presentations, with surveys collected from audience members. In addition, MDCH disseminated a Web-based survey and added four questions to the 2008 Michigan Behavioral Risk Factor Survey (BRFS), an annual random-digit-dialed telephone survey, to gauge public support for the use of dried blood spots in specific types of health research.[5] Ethical, legal, public health, and research representatives assembled in a roundtable meeting to discuss ownership issues, appropriate guidelines for dried blood spot use within legal parameters, and ethical concerns to be considered when defining the state's "qualified ownership" of dried blood spots.[6]

Infrastructure development

On June 1, 2009, MDCH announced plans to proceed with development of the BioTrust through a news release and press conference for media.[7] Primary partners were the Van Andel Institute, Michigan State University, University of Michigan, and Wayne State University, which arranged to house the Michigan Neonatal Biobank (MNB) as part of the university's Biobanking Center of Excellence. The MNB, a 501(c)(3) nonprofit organization, was designated as the repository for storage of residual dried blood spots for potential future research use. Under supervision of the NBS laboratory manager, student assistants began to separate each dried blood spot filter paper card from the NBS kit and label it with a bar code before transferring it to the MNB for storage. Three formal advisory boards were appointed to guide policy development, including a Community Values Advisory Board (CVAB), Scientific Advisory Board (SAB), and MNB Board of Directors. Existing NBS staff members were designated to coordinate BioTrust outreach and education and to develop a protocol for the approval of research applications and use of MDCH data. To enhance communication and planning, an MDCH intradepartmental workgroup met monthly, with members consisting of senior leadership from the NBS Program (laboratory and follow-up), Epidemiology, Institutional Review Board (IRB), Legal Affairs, and Public Health Administration, as well as the department's Chief Medical Executive.

Parental consent process

A proposal to store dried blood spots in the MNB for possible future research was presented to the MDCH IRB in 2009. After consulting with the U.S. Department of Health and Human Services' Office of Human Research Protections, the IRB directed Michigan NBS to develop a parental consent process for research use of prospectively collected specimens. A National Institutes of Health Certificate of Confidentiality was also requested and received in 2010. Staff worked during a 10-month period to develop the consent process, with considerable input from the CVAB and hospital nursery personnel. Existing Michigan NBS brochures were updated, an educational DVD was produced, and BioTrust educational materials were developed. Michigan NBS brochures and BioTrust consent booklets were focus group tested for readability and translated into Arabic and Spanish. The NBS kit was revised to include a BioTrust consent form, and a database was created to record consent form results.

Regional trainings for hospital NBS coordinators were held across the state in 2009, allowing introduction of the BioTrust consent process. Eleven hospitals, selected for geographic diversity and number of births, were willing to participate in an early implementation phase that began in May 2010. These hospitals received a small supply of NBS kits at no charge in exchange for their feedback. After best practices were identified, the MDCH director notified remaining birthing hospitals by letter that effective October 1, 2010, Michigan NBS would require a parent's consent for research use of residual dried blood spots.

Staff then launched an extensive training initiative to ensure birthing hospitals were prepared to inform parents about NBS and implement the BioTrust

consent process. Two part-time temporary educators were hired to assist the BioTrust Community Outreach Coordinator and NBS Nurse Consultant with the education campaign. Neonatal nurses, childbirth educators, midwives, and a number of prenatal/pediatric clinicians were invited to participate in in-service presentations, a webcast, and/or online training modules (voice-recorded PowerPoint presentations) provided by Michigan NBS staff.

OUTCOMES

MDCH community engagement endeavors revealed that a majority of adult Michigan residents supported the use of dried blood spots in research generally, with even higher support for specific categories of research such as childhood disorders. For instance, 61.7% of focus group participants strongly supported research use, while 24.7% somewhat supported it. Among BRFS respondents, 72% said they favored such use.[4,5] Considering the responsibilities of public health departments, as established in Michigan law, the legal roundtable determined that MDCH had "qualified ownership" of residual dried blood spots.[6] This ownership allows MDCH to exercise control over the use of dried blood spots for the benefit of the child and the public, while taking into account ethical considerations. MDCH is ultimately legally and ethically obligated to follow regulatory research requirements while serving as a trustee or steward of dried blood spots.[6]

CVAB member organizations were originally chosen after the Community Engagement Workgroup identified the following sectors as important for assuring the representation of diverse communities that embody "the public": (*1*) general public, including business and legal representatives; (*2*) cultural, religious, and historical group representatives; (*3*) health professionals; and (*4*) disease/health advocacy groups (Figure 2). The CVAB has played an important role in guiding MDCH on the development of policies and written materials. Members also made recommendations to further diversify the committee's composition, hosted BioTrust presentations for some of their own organizations, and helped MDCH staff prioritize venues for community education.

While deliberating the need for parental consent for future research use of prospectively collected dried blood spots, the IRB granted a waiver of consent for the use of archived specimens due to the low risk to human subjects and impracticability of recontacting millions of individuals. Provisional to this waiver was that Michigan NBS make efforts to widely publicize the BioTrust, including methods for individuals to opt out. Accordingly, MDCH initiated an awareness campaign informing communities about the importance of NBS and promoting informed decision-making regarding BioTrust participation. During a two-year period, interviews were granted with reporters, and meetings were held with the state's two largest newspaper editorial boards, leading to considerable print and television exposure, including a front-page article in Detroit's major newspaper. Local public health employees from Women, Infants and Children, Children's Special Health Care Services, and the Maternal Infant Health Program were informed of the BioTrust via mass e-mail. Additional outreach activities are ongoing and include health fair and early childhood conference exhibits, information tables at health clinics, grand rounds presentations, and lectures to college students. By the end of 2011, more than 3,500 individuals had been reached at 75 events.

As of May 2012, more than one-third (>1.5 million/4.5 million) of dried blood spot samples in Michigan's archive had been transferred to the MNB. The MNB cannot access any MDCH data or registries; thus, samples are de-identified while stored. Preservation of specimens has been optimized by MNB humidity and temperature controls, and samples collected since January 2009 are now frozen at −20°C.

Protocols were developed for a two-step review and de-identification process prior to the release of dried

Figure 2. Organizations represented on the Michigan BioTrust for Health Community Values Advisory Board[a]

ACCESS
American Cancer Society Great Lakes Division, Inc.
American Civil Liberties Union of Michigan
The Asian Center
Cristo Rey Community Center (Hispanic community organization)
March of Dimes—Michigan Chapter
MichBio
Michigan Association of Black Social Workers
Michigan Association of Genetic Counselors, Inc.
Michigan Council for Maternal and Child Health
Michigan Developmental Disabilities Council
Michigan Environmental Council
Michigan Health and Hospital Association
Michigan Minority Health Coalition
National Alliance on Mental Illness—Michigan
The Network for Public Health Law—Mid-States Region

[a]Reflects membership as of May 2012. Representatives from a faith-based organization and a Native American tribal organization also held seats and are in the process of being reappointed. The Board is currently seeking two members-at-large.

ACCESS = Arab Community Center for Economic and Social Services

blood spots. First, the MDCH IRB and BioTrust SAB review panel must approve the study proposal. Following approval, Michigan NBS tells MNB which samples to release by barcode number. MNB then replaces the code used for storage with a research-specific code that MDCH does not receive. A "user-fee" structure for research studies was established that takes into account requested specimen size, number of samples, and complexity of associated data request. The SAB, comprising members with diverse scientific expertise, ensures that requests for dried blood spots have scientific merit and adhere to BioTrust Research Guidelines. These guidelines were based on themes originally identified by the Research Workgroup and include (*1*) conducting research to benefit the public's health, (*2*) protecting human subjects, (*3*) balancing private gain and public good, and (*4*) respecting the role of public input. After endorsement by the CVAB, the guidelines provided a framework for the formal MDCH Policy.[8]

Feedback from eight of 11 hospitals during the early implementation phase of the BioTrust consent process identified best practices prior to statewide implementation. In the majority (81.5%) of total patient encounters (n=658), staff required less than five minutes to clarify questions after parents read the BioTrust consent material. Hospital employees facilitating the consent process were predominantly nurses (62.3%) or clerks (34.1%). They spent similar amounts of time with patients, but parents were more likely to sign consent forms administered by a nurse (76%) than by a clerk (70%). Minor revisions to the BioTrust consent form were recommended by hospital staff and parents to ensure dissent was clearly delineated. A checkbox added to the form allowed hospital staff to mark "parent declined."

Following the pilot phase, all 78 remaining birthing hospitals were enrolled in training sessions provided by MDCH. Sixty-two percent of hospitals participated in online training modules, 29% in in-service presentations, and 9% in a webcast hosted by Michigan NBS. On the post-training evaluation form, 98% of the 501 participants with completed post-evaluation forms indicated their intention to alter patient education processes not only about the BioTrust but also about NBS, with 78.2% stating that more information would be provided, 60% stating that more time would be spent with parents, and 51% indicating that different information would be provided. As of December 2011, continuing education credit had been issued to 635 nurses, and BioTrust/NBS presentations had been provided at 14 pediatric/obstetric and gynecology grand rounds and five hospital pediatric business meetings.

Approximately 99.6% of Michigan births undergo NBS, resulting in 166,992 NBS cards submitted to the state public health laboratory, the designated testing facility, during an 18-month period from October 1, 2010, through March 31, 2012. To track adherence to the process, birthing hospitals are instructed to return a BioTrust consent form for every screened birth. During this time period, 59.2% (n=98,932) of consent forms were signed, granting consent; 15.5% (n=25,946) were marked "parent declined," documenting dissent; 17.2% (n=28,685) were returned blank; and 8.0% (n=13,429) were not returned. The majority (82%) of birthing hospitals had more than 50% of parents grant consent for use of their child's residual dried blood spots in research through the BioTrust.

Following the Michigan NBS education campaign, there was a slight increase in parental requests to specify disposition of their child's dried blood spots after completion of NBS, but overall, the number of such requests remains low. Nine requests were received in 2009 to have dried blood spot samples destroyed. The number of requests for dried blood spot sample destruction increased to 34 in 2010, while 37 requests were made to label dried blood spot samples unavailable for research. In 2011, the numbers remained similar, with 45 requests for destruction and 22 for removal from the research pool. The number of parents declining NBS following a hospital birth increased following implementation of the BioTrust parental consent process—18 parents (0.02%) declined in 2009 compared with 41 parents (0.04%) in 2010 and 40 parents (0.04%) in 2011. However, it is difficult to disentangle effects of the BioTrust consent process from increased awareness of NBS due to educational efforts.[9]

LESSONS LEARNED

MDCH recognizes research as one of the 10 Essential Public Health Services that can lead to new insights and innovative solutions to health problems, ultimately improving the public's health; but numerous ethical layers and challenges arise in using residual dried blood spots not initially collected for such a purpose.[6,10]

In addition, MDCH acknowledges the need to monitor ongoing challenges and emerging national guidelines pursuant to recommendations from the U.S. Secretary of Health and Human Services' Advisory Committee on Heritable Disorders in Newborns and Children (SACHDNC).[11] Figure 3 illustrates Michigan responses to key SACHDNC recommendations. While MDCH has placed emphasis on complying with these recommendations, we recognize that ultimate resolution for each state depends on existing infrastructure, policies, and laws.[12] Michigan's public health code

Figure 3. MDCH responses to recommendations for state NBS programs from the U.S. SACHDNC[a]

SACHDNC recommendations	*MDCH responses*
All state NBS programs should have a policy in place that has been reviewed by the state attorney general or other appropriate legal authority that specifies who may access and use dried blood specimens once they arrive at the state-designated NBS laboratory, including further access after NBS tests are completed.	1999 Governor's Commission on Genetic Privacy and Progress final recommendations to store dried blood spots indefinitely because of their potential use in health research prompts an amendment of MDCH public health code in 2000 to allow the use of residual dried blood spots in research.
All state NBS programs should have a policy in place that has been reviewed by the state attorney general or other appropriate legal authority addressing the disposition of dried blood specimens remaining after NBS. Policy makers should consider the value of the specimens as a promising resource for research, the importance of protecting the privacy and confidentiality of families, and the necessity of ensuring the public's trust.	Michigan Attorney General Office is apprised of BioTrust policies and procedures. MDCH Chief Medical Executive, IRB Chair, Public Health Deputy, Public Health Legal Advisor, Laboratory Director, and State Epidemiologist become involved in BioTrust policy development.
All state NBS programs should develop a well-defined strategy to educate health-care professionals who provide patients with prenatal and postnatal care about NBS and the potential uses of residual NBS specimens.	An education initiative for health-care professionals targets prenatal and pediatric care providers, as well as childbirth educators and hospital nursery staff, through in-service presentations, online training modules, grand rounds, webcasts, and dissemination of written material.
All state NBS programs should work proactively to ensure that all families of newborns are educated about NBS as a part of prenatal and postnatal care.	MDCH revises NBS brochures and website, makes an educational video available for parents, and staffs NBS displays at local health and baby fairs.
All state NBS programs should create policies that are in compliance with federal research regulations, assure that parents are aware of these activities, and consider whether documentation of parents' wishes and willingness to participate are required.	MDCH consults with federal Office for Human Research Protections, leading to an IRB decision to waive informed consent for the use of archived residual dried blood spots, with the caveat that MDCH make an effort to inform the public about their options. MDCH IRB determines that informed consent should be required for research use of any prospectively collected dried blood spots beginning May 1, 2010.

[a]Therrell BL Jr, Hannon WH, Bailey DB Jr, Goldman EB, Monaco J, Norgaard-Pedersen B, et al. Committee report: considerations and recommendations for national guidance regarding the retention and use of residual dried blood spot specimens after newborn screening. Genet Med 2011;13:621-4.

MDCH = Michigan Department of Community Health

NBS = newborn screening

SACHDNC = Secretary of Health and Human Services' Advisory Committee on Heritable Disorders in Newborns and Children

IRB = Institutional Review Board

allowed implementation of the BioTrust, but other states may be limited in their ability to launch such initiatives without similar regulations. Government-sponsored population-based biobanks depend on public participation, acceptance of research visions, and trust in safeguards for participants.[13]

Retention and use of residual dried blood spots for research have been the subject of national discourse for several years, with multiple studies conducted to assess both general public and parental attitudes, as well as preferences for opt-in vs. opt-out consent processes.[4,5,14] However, Michigan was the first state to proactively implement a universal parental consent process as part of routine NBS procedures. A combination of factors allowed us to build a foundation for the use of dried blood spots acceptable to the public, including our law, commitment to community engagement, and consent process. Our findings, based on the actual proportion of Michigan parents granting consent for use of their child's specimen in the BioTrust, are consistent with previously measured baselines of public support for dried blood spot research in Michigan and nationally using survey data.[4,5,15]

Two critical measures of a universal consent process are the potential impact on NBS and the population of blood spots remaining available for research. We have not observed a substantial increase in parental refusal for NBS, despite potential concerns that increased publicity might negatively impact the program.[16] Historically, nearly all blood spots collected were available

for health research. Of the more recent specimens collected since 2010, currently 59.2% are available for use based on parental consent. While this is a significant reduction, it may be a necessary tradeoff to ensure public support and continued availability of any specimens for health research. Work is underway to determine whether the consented population has similar demographics to the newborn population and if additional or different outreach measures are needed.

Michigan's existing NBS infrastructure was critical in developing the BioTrust, which could not have occurred without collaboration among NBS laboratory and follow-up personnel, advisory committees, hospitals, and health-care providers. In particular, previously designated NBS coordinators in all birthing hospitals were a significant asset for adoption of the BioTrust consent process. Through this collaboration and the MDCH policy to collect blank forms, hospitals with low consent form return rates can be quickly identified, and interventions can be implemented to help them meet performance targets. The need to monitor consent process metrics is demonstrated by three large birthing hospitals continually submitting significant numbers (>75%) of incomplete consent forms. This statistic emphasizes one of the most challenging aspects of this initiative, namely, implementing the BioTrust consent process in the absence of a state mandate. Fortunately, most birthing hospitals were receptive, and even though consent is not obtained for NBS itself, there are anecdotal reports that the process has led to increased parent education on NBS and policies regarding the storage and use of residual dried blood spots.

Presumably, a lack of funding is a significant barrier for other states to embark on a similar endeavor. Although the goal for the BioTrust is to one day be self-sustaining based on research user fees, significant staff time, technology, and materials have been donated or funded through small grant awards thus far. Revising an existing employee's work plan to include implementation and coordination of the BioTrust has also been necessary.

Additional challenges included establishing policies and procedures for specimen storage and use while Michigan NBS continued to accrue new samples. Various phases of the BioTrust had to be implemented while certain policies were being refined. This process created the need to ensure that all staff and partners remained abreast of rapidly occurring changes so that accurate information was disseminated.

CONCLUSION

Michigan has expanded the potential public health "good" of NBS by making residual dried blood spots available for population-based health research in a manner that is acceptable to the public using a parental consent process administered by birthing hospitals. We remain cognizant of the need for continued transparency, community outreach, and education to assure that new parents, as well as individuals whose specimens were archived in the BioTrust, are aware of their options. With CVAB guidance, future efforts will focus on outreach to increase parental awareness during prenatal education, evaluation of the consent process from parent and hospital perspectives, increased use of social media to inform people aged 18–25 years that their dried blood spots are stored, and placement of questions on state population surveys to monitor changes in public awareness or attitudes.

Since formal implementation of the BioTrust, 14 research proposals (2009–2011) have been approved for use of residual dried blood spots. These research proposals demonstrate a heightened awareness of the availability of residual dried blood spots, as only 10 studies had been approved during the previous 10-year period from 2000 to 2009. In the future, SAB members plan to focus on promoting dried blood spot use in the scientific community to increase utilization of BioTrust resources, and the state of Michigan also plans to partner with the Newborn Screening Translational Research Network's Virtual Repository of Dried Blood Spots to help achieve benefits of population health research using residual dried blood spots.

The authors thank the many workgroup and board members who contributed their time and insight to development of the BioTrust; Jean Chabut, Corinne Miller, Kevin Cavanagh, Harry Hawkins, Bill Young, and other NBS personnel; and birthing hospital staff.

Initial work to ascertain the feasibility of using Michigan dried blood spots for research was supported in part by Cooperative Agreement #U58/CCU522826 from the Centers for Disease Control and Prevention (CDC), Office of Public Health Genomics, which also provided subsequent funding for production of the Michigan Newborn Screening/BioTrust educational video. The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of CDC.

The work described in this article was conducted in accordance with the policies and procedures of the Michigan Department of Community Health (MDCH), including requirements for approval by the MDCH Institutional Review Board.

REFERENCES

1. Michigan Commission on Genetic Privacy and Progress. Final report and recommendations. Lansing (MI): Michigan Department of

Community Health; 1999. Also available from: URL: http://www.michigan.gov/documents/GeneticsReport_11649_7.pdf [cited 2012 Jun 1].
2. Public Health Code. Michigan Complied Laws, §333.5431(7)(b) (1978).
3. State of Michigan, Department of Community Health. Newborn screening specimen retention policy. 2008 [cited 2012 Jun 1]. Available from: URL: http://www.michigan.gov/documents/mdch/11.1_NBSspecimenretentionpolicy_316310_7.pdf
4. Duquette D, Langbo C, Bach J, Kleyn M. Michigan BioTrust for Health: public support for using residual dried blood spot samples for health research. Public Health Genomics 2012;15:146-55.
5. Duquette D, Rafferty A, Fussman C, Gehring J, Meyer S, Bach J. Public support for the use of newborn screening dried blood spots in health research. Public Health Genomics 2011;14:143-52.
6. Chrysler D, McGee H, Bach J, Goldman E, Jacobson PD. The Michigan BioTrust for Health: using dried bloodspots for research to benefit the community while respecting the individual. J Law Med Ethics 2011;39 Suppl 1:98-101.
7. State of Michigan, Department of Community Health. Michigan Department of Community Health collaborates with state universities, Van Andel Institute to create Michigan BioTrust for Health [press release]; 2009 Jun 1 [cited 2012 Jun 1]. Available from: URL: http://www.michigan.gov/mdch/0,1607,7-132-8347-215747–,00.html
8. State of Michigan, Department of Community Health. Policy and procedure manual. Guidelines for research use of dried blood spots. Policy #11.4. 2010 [cited 2012 Jun 1]. Available from: URL: http://www.michigan.gov/documents/mdch/DCH_Policy_11.4_366131_7.pdf
9. State of Michigan, Department of Community Health. Michigan Newborn Screening Program annual report 2010 [cited 2012 Jun 1]. Available from: URL: http://www.michigan.gov/documents/mdch/NBS_Annual_Report_2010_361032_7.pdf
10. Centers for Disease Control and Prevention (US). 10 essential public health services [cited 2012 Jun 1]. Available from: URL: http://www.cdc.gov/nphpsp/essentialservices.html
11. Therrell BL Jr, Hannon WH, Bailey DB Jr, Goldman EB, Monaco J, Norgaard-Pedersen B, et al. Committee report: considerations and recommendations for national guidance regarding the retention and use of residual dried blood spot specimens after newborn screening. Genet Med 2011;13:621-4.
12. Lewis MH, Goldenberg A, Anderson R, Rothwell E, Botkin J. State laws regarding the retention and use of residual newborn screening blood samples. Pediatrics 2011;127:703-12.
13. Swede H, Stone CL, Norwood AR. National population-based biobanks for genetic research. Genet Med 2007;9:141-9.
14. Botkin JR, Rothwell E, Anderson R, Stark L, Goldenberg A, Lewis M, et al. Public attitudes regarding the use of residual newborn screening specimens for research. Pediatrics 2012;129:231-8.
15. Tarini BA, Goldenberg A, Singer D, Clark SJ, Butchart A, Davis MM. Not without my permission: parents' willingness to permit use of newborn screening samples for research. Public Health Genomics 2010;13:125-30.
16. Rothwell EW, Anderson RA, Burbank MJ, Goldenberg AJ, Lewis MH, Stark LA, et al. Concerns of newborn blood screening advisory committee members regarding storage and use of residual newborn screening blood spots. Am J Public Health 2011;101:2111-6.

Receipt and Use of Free Condoms Among U.S. Men Who Have Sex with Men

Christine Khosropour, MPH[a]
Patrick S. Sullivan, DVM, PhD[a]

ABSTRACT

Objectives. Despite large public investments in condom distribution programs for HIV prevention among men who have sex with men (MSM), few evaluations have documented the reach of condom distribution programs or whether free condoms distributed to MSM are actually used. Among MSM recruited from social networking and dating websites, we examined the proportion who reported acquiring and using free condoms, and associations between select characteristics and reported acquisition and use of free condoms.

Methods. We used baseline data from a prospective, online cohort of U.S. MSM. Participants reported acquiring free condoms in the 12 months before interview and, for those who acquired condoms and had anal intercourse, use of the free condoms they acquired. We used multivariable log binomial regression models to describe factors associated with self-reported acquisition and use of condoms.

Results. Of the 2,893 men in the analytic sample, 1,701 (59%) reported acquiring free condoms in the past year. Acquisition of free condoms was higher for men who were younger, more educated, recently tested for HIV, and had higher numbers of sex partners. Seventy-three percent of men who acquired free condoms reported using them; use was higher for men who were black, had been recently tested for HIV, and reported greater numbers of sex partners.

Conclusions. Most MSM in our online sample reported receiving free condoms, and most who acquired free condoms reported using them. These data suggest that condom distribution programs have reasonable reach and utility as part of a comprehensive package of HIV prevention interventions for U.S. MSM.

[a]Emory University, Rollins School of Public Health, Department of Epidemiology, Atlanta, GA

Address correspondence to: Patrick S. Sullivan, DVM, PhD, Emory University, Rollins School of Public Health, Department of Epidemiology, 1518 Clifton Rd. NE, MS-1518-002-4AA, Atlanta, GA 30322; tel. 404-727-2038; fax 866-311-8264; e-mail <pssulli@emory.edu>.

©2013 Association of Schools and Programs of Public Health

Men who have sex with men (MSM) are the group at highest risk for HIV infection in the U.S. In 2010, 61% of all new human immunodeficiency virus (HIV) diagnoses in the U.S. were among MSM,[1] who only account for an estimated 2% of the U.S. population.[2] Further, MSM have been the only risk group in which HIV incidence has been increasing since the early 1990s.[3]

Condoms have been identified as a method to prevent sexual transmission of HIV since the early phases of the HIV epidemic in the U.S. In 1986, the Centers for Disease Control and Prevention issued a recommendation for the use of condoms to prevent sexual transmission of HIV, even prior to definitive findings of the effectiveness of condoms to prevent HIV transmission had been released.[4] Since that time, condoms have been recognized as the most effective method to prevent the sexual transmission of HIV, aside from abstinence,[5–8] and condom promotion remains a mainstay of HIV prevention strategies, including the National HIV/Acquired Immunodeficiency Syndrome (AIDS) Strategy for the United States.[9]

Although the effectiveness of condoms to prevent HIV transmission is well recognized, studies have noted that barriers to obtaining condoms, such as cost[10] and embarrassment associated with purchasing condoms,[11] may prevent condom use. Given the demonstrated benefits of condoms coupled with the fact that barriers to purchasing condoms may prevent condom acquisition, many health departments, clinics, community-based organizations, and AIDS service organizations have implemented free condom distribution programs to ensure those individuals most at risk for HIV infection, such as MSM, have access to condoms.[12–14] Regardless of the size of the program, distributing free condoms requires the dedication of significant resources. For example, Louisiana's statewide condom availability program, which distributed more than 33 million condoms from 1994 to 1996, cost an estimated $3 million during the three-year period.[15] The Free Condom Initiative by the New York City Department of Health and Mental Hygiene (NYC DOHMH) distributed 17.3 million condoms in 2006 at a cost of $1.59 million.[13]

Because of the considerable financial and organizational commitment involved in distributing free condoms, understanding the impact of free condom distribution is essential. Although it is important to define key indicators, such as the number of condoms distributed,[16] to measure a program's success, it is critical to determine the type of individuals receiving free condoms to ensure that those most at risk for HIV infection both have access to and make use of free condoms. To date, few studies have examined factors associated with acquisition and use of free condoms among MSM; those studies that have been conducted have been limited in geographic region to either one state[17] or to urban areas.[18] To address these research gaps, we examined characteristics associated with acquisition and use of free condoms using data from a national online HIV prevention survey.

METHODS

Recruitment and study design

MSM were recruited from August to December 2010 through selective placement of banner advertisements on social networking and Internet dating websites, including Facebook, MySpace, Black Gay Chat, and Adam4Adam. Eligible participants were male, ≥18 years of age, and reported sex with a male in the past 12 months. After providing informed consent, men completed a 60-minute survey that included questions on condom acquisition and use, demographics, sexual risk behaviors, sexual partner history, and HIV testing history.

Measures and statistical analysis

We analyzed data from participants who completed the condom receipt and use questions, which appeared in the final eighth of the survey. To examine the frequency of acquisition and use of free condoms by our study population, we asked respondents, "In the past 12 months, have you received free condoms?" Participants who reported receiving free condoms were asked, "Have you used any of the free condoms you received?" To examine the characteristics associated with the use of free condoms, we limited the analysis to include only those participants who indicated that they had anal sex with a male sex partner in the past 12 months.

Because the condom questions appeared near the end of the survey, we also compared the characteristics of participants who started but did not complete the survey with those who completed the survey to assess any potential selection bias among the study population included in the analysis.

We identified two variables as main effects of interest for acquisition and use of free condoms—race/ethnicity and age. To facilitate comparisons between our study results and national data,[19] men <25 years of age were categorized into two age groups: 18–19 and 20–24 years of age. Men aged ≥25 years were categorized in five-year age groups. Potential confounders were identified based on a literature review and expert opinion and included: education level, yearly income, sexual identity, having received an HIV test, HIV status, gender of sex partners (i.e., only men or

men and women), number of male sex partners, and having used the Internet to meet a sex partner (all behaviors in the 12 months before interview). Having had unprotected anal intercourse (UAI) with a male sex partner in the past 12 months was also examined as an independent factor of interest for the analysis of free condom acquisition, and having had ≥1 main male sex partners in the past 12 months was included as an independent variable of interest in the analysis of free condom usage.

We used log binomial regression models to examine bivariate and multivariate associations between the independent factors and the two outcomes of interest—having acquired free condoms in the past 12 months and use of free condoms acquired—and reported them as adjusted prevalence ratios with 95% confidence intervals. All variables, regardless of the results from the bivariate analysis, were considered in the multivariable models. Backward elimination was used to determine which variables were significantly associated ($p<0.05$) with the outcome variables of interest. Because race/ethnicity and age were the primary independent factors of interest in the analysis, these variables were retained in each model during backward elimination, regardless of their significance. Other independent variables that remained in the model at the conclusion of backward elimination were considered for two-way interactions. Using retained regressors from the reduced model, all two-way interactions were considered together with a *p*-value adjusted for simultaneous assessment to result in an aggregate alpha of 0.05 for evaluation of interaction. All data analyses were performed using SAS® version 9.2.[20]

RESULTS

Of the 9,980 participants who were eligible to participate in the survey, 8,503 (85%) provided informed consent and, of those, 6,104 (72%) began the survey (data not shown). Characteristics of participants by survey completion status are provided in Table 1. Forty-seven percent of participants (n=2,847/6,104) completed the baseline survey in its entirety. Among all participants, slightly less than half were white and approximately one-quarter were black. More than 40% of participants were <25 years of age and approximately one-third were college-educated. Participants were predominantly gay-identified and HIV-negative, and the vast majority reported having sex with only male sex partners in the past 12 months.

Survey completion was higher among men from specific strata: men were more likely to complete the survey if they were white vs. nonwhite, >19 years vs. 18–19 years of age, gay-identified vs. non-gay-identifed, HIV-negative vs. HIV-positive, reported UAI in the past year vs. no UAI reported in the past year, or had only male sex partners vs. male and female sex partners (Table 1). Residence data available for a subset of participants revealed the following geographic distribution[21]: Northeast (15%), Midwest (18%), South (41%), and West (25%) (data not shown).

Of the 6,104 participants who began the baseline survey, 2,893 (47%) answered the question about acquiring free condoms, and 1,701 (59%) indicated that they had acquired free condoms in the past 12 months (data not shown). Some participants who provided information on the outcomes did not complete all items after the condom questions, so the number with complete data for this analysis was higher than the number completing the entire survey.

In the multivariable model (Table 2), acquiring free condoms was associated with reporting greater than a high school education, receiving an HIV test in the past 12 months, and reporting more than two male sex partners in the past 12 months. Men aged 45–54 years were less likely to report acquiring free condoms compared with men aged 18–19 years, and men reporting UAI in the past 12 months were also less likely to report acquiring free condoms compared with men who did not report UAI in the past 12 months. Although in the bivariate analysis men who reported using the Internet to meet a sex partner in the past year were more likely to receive free condoms than men who did not meet a sex partner on the Internet, this association was not significant in the multivariable model because of confounding with number of sex partners (data not shown).

Of the 1,701 men who reported receiving free condoms in the past 12 months, 1,549 (91%) responded to the survey question regarding the use of free condoms and reported having anal sex with a male partner in the past 12 months (data not shown). Table 2 describes the characteristics associated with using free condoms. Approximately 73% (n=1,127/1,549) of participants reported using the free condoms that they had acquired (data not shown). Reported use of free condoms was associated with black vs. white race/ethnicity, receiving vs. not receiving an HIV test in the past 12 months, and greater numbers of sex partners. There was no significant two-way interaction in either model.

DISCUSSION

Although condom distribution programs have existed in the U.S. for more than 30 years, few studies to date have examined the characteristics of individuals who

acquire and use free condoms. To our knowledge, this analysis identified for the first time factors associated with the reported acquisition and use of free condoms by a geographically diverse group of MSM enrolled in an online HIV behavioral risk study. Overall, slightly less than 60% of our MSM population indicated that they had acquired free condoms in the past 12 months and, of those, approximately three-quarters of men who also indicated that they had had anal sex in the past year reported using the free condoms they had acquired.

Our data suggest that MSM who reported acquiring free condoms were more likely to be younger and have greater than a high school education than those who did not acquire free condoms, while men who reported using the free condoms were more likely to be black than white. Having received an HIV test in the past year was associated with both acquiring and using free condoms. This finding is unsurprising, considering that many HIV testing clinics and centers distribute free condoms. However, it is notable that, among men

Table 1. Characteristics of MSM enrolled in an online HIV prevention study (*n*=6,104), by survey completion status: U.S., 2010

Participant characteristic[a]	*Completed survey (n=2,847)* N *(percent*[b]*)*	*Did not complete survey (n=3,257)* N *(percent*[b]*)*	*Total (n=6,104)* N *(percent*[c]*)*
Race/ethnicity			
Non-Hispanic			
White	1,603 (59)	1,134 (41)	2,737 (45)
Black	443 (31)	964 (69)	1,407 (23)
Asian/Pacific Islander	81 (36)	144 (64)	225 (4)
Native American/Alaska Native	46 (34)	89 (66)	135 (2)
Multiracial	196 (43)	262 (57)	458 (8)
Other	74[d] (31)	165[e] (69)	239 (4)
Hispanic	404 (45)	499 (55)	903 (15)
Age (in years)			
18–19	302 (41)	426 (58)	728 (12)
20–24	806 (44)	1,024 (56)	1,830 (30)
25–34	876 (50)	889 (50)	1,765 (29)
35–44	435 (46)	502 (54)	937 (15)
45–54	313 (49)	327 (51)	640 (10)
≥55	115 (56)	89 (44)	204 (3)
Education			
College/postgraduate	1,115 (56)	858 (44)	1,973 (37)
Some college/associate degree	1,141 (56)	888 (44)	2,029 (38)
High school or GED	494 (44)	605 (55)	1,099 (21)
Less than high school	85 (38)	136 (62)	221 (4)
Yearly income			
≤$14,999	852 (52)	781 (48)	1,632 (34)
$15,000–$39,999	804 (57)	613 (43)	1,417 (30)
$40,000–$74,999	571 (59)	394 (41)	965 (20)
≥$75,000	433 (57)	329 (43)	762 (16)
Sexual identity			
Homosexual	2,289 (58)	1,670 (42)	3,959 (77)
Bisexual	463 (45)	563 (55)	1,026 (20)
Heterosexual	25 (35)	46 (65)	71 (1)
Other	61 (54)	53 (46)	114 (2)
HIV status			
HIV-negative	1,963 (60)	1,307 (40)	3,270 (83)
HIV-positive	238 (44)	304 (56)	542 (14)
Indeterminate	9 (26)	26 (74)	35 (1)
Did not receive results	44 (58)	32 (42)	76 (2)
Tested for HIV, past 12 months			
Yes	1,399 (57)	1,069 (43)	2,468 (50)
No	1,433 (57)	1,076 (43)	2,509 (50)

continued on p. 389

Table 1 (continued). Characteristics of MSM enrolled in an online HIV prevention study (*n*=6,104), by survey completion status: U.S., 2010

Participant characteristic[a]	*Completed survey (n=2,847)* N (*percent*[b])	*Did not complete survey (n=3,257)* N (*percent*[b])	*Total (n=6,104)* N (*percent*[c])
Gender of SP, past 12 months			
Men	2,606 (48)	2,838 (52)	5,444 (89)
Both men and women	241 (37)	419 (63)	660 (11)
Had UAI with MSP, past 12 months			
Yes	1,964 (67)	946 (33)	2,910 (74)
No	601 (59)	426 (41)	1,027 (26)
Used Internet to meet SP, past 12 months			
Yes	1,953 (54)	1,646 (56)	3,599 (71)
No	862 (59)	606 (41)	1,468 (29)

[a]Totals for most variables do not equal total number of respondents due to missing values.

[b]Represents percentage of participants who completed or did not complete survey, among those with that characteristic (row percent)

[c]Represents percentage of total participants (column percent)

[d]Includes "other" (*n*=50) and "prefer not to answer" (*n*=24)

[e]Includes "other" (*n*=103) and "prefer not to answer" (*n*=62)

MSM = men who have sex with men

HIV = human immunodeficiency virus

GED = general equivalency diploma

SP = sex partner

UAI = unprotected anal intercourse

MSP = male sex partner

who reported acquiring free condoms, those who had been tested for HIV were significantly more likely to report using the free condoms they had acquired than those who had not been HIV tested recently. Similar risk-reducing behaviors post-HIV testing have been noted among HIV-positive men,[22] and this result may suggest that a specific aspect of the HIV testing process (i.e., pre- or posttest counseling) encouraged these participants to use their free condoms. Alternatively, men who sought testing may have been inherently more motivated to reduce their risk of HIV acquisition.

It is also of note that men in our sample who reported acquiring free condoms were significantly less likely to report having UAI in the past 12 months. This may suggest that increasing condom accessibility increases condom use,[14] or it could reflect a bias for men intending to use condoms to accept them if offered. Further, men with more than two male sex partners were more likely to report both acquiring and using free condoms compared with men with one to two partners, suggesting that free condom distribution may be benefiting those at high risk (i.e., men with more sex partners).

Among our respondents, approximately 59% reported acquiring free condoms in the past year. This figure is well below survey data from the 2003–2005 National HIV Behavioral Surveillance System (NHBS), in which 80% of MSM respondents reported receiving free condoms.[18] Although there is an approximate five- to seven-year time span between our survey and the 2003–2005 NHBS, it is unlikely that the distribution of free condoms in the U.S. has decreased to levels that would account for the discrepancy seen between the two surveys. Instead, it is possible that, because NHBS MSM respondents are recruited from physical venues where MSM congregate (which are often the same locations where free condoms are distributed), the 2003–2005 NHBS overrepresented the proportion of all MSM who were in receipt of free condoms. Our data, in which MSM were recruited from a variety of social networking websites, reflect an estimate that includes non-venue-attending MSM.

Although fewer than 60% of our respondents acquired free condoms in the past 12 months, approximately 75% reported using the free condoms that they received, and those who used their condoms were more likely to be black than white. When considering the resources to distribute free condoms, it is a promising finding that the majority of MSM who reported both acquiring free condoms and having anal sex do use the free condoms that they obtain. Specifically, the fact that black men, who are at increased risk for HIV infection

among MSM, are more likely to use free condoms than white men is encouraging for the continuation of condom distribution programs. Further, 80% of young MSM aged 18–19 years in our sample reported using free condoms, an encouraging finding considering that young MSM are more likely to be unaware of their HIV infection than MSM of older age groups.[19]

Limitations

This study had a number of limitations. First, the two outcomes of this study were self-reported; therefore, reported acquisition and especially use of free condoms was likely overestimated.[23,24] However, because the condom usage question was asked in the context of free condoms (i.e., we only asked if participants used their free condoms, not if they used any condoms), the extent of misclassification in our estimate might

Table 2. Factors associated with self-reported acquisition and use of free condoms in the past 12 months among MSM enrolled in an online HIV prevention study (*n*=6,104): U.S., 2010

Respondent characteristic	*Self-reported acquisition of free condoms (n=2,893) APR (95% CI)*	*Self-reported use of free condoms acquired[a] (n=1,549) APR (95% CI)*
Race/ethnicity		
Non-Hispanic white	Referent	Referent
Non-Hispanic black	1.01 (0.93, 1.09)	1.12 (1.05, 1.19)
Hispanic	1.06 (0.98, 1.15)	1.00 (0.92, 1.08)
Non-Hispanic other[b]	1.04 (0.95, 1.21)	1.03 (0.95, 1.11)
Age (in years)		
18–19	Referent	Referent
20–24	0.94 (0.84, 1.05)	0.91 (0.93, 0.99)
25–34	0.94 (0.84, 1.05)	0.90 (0.82, 0.98)
35–44	0.89 (0.79, 1.02)	0.91 (0.82, 1.01)
45–54	0.81 (0.70, 0.94)	0.94 (0.85, 1.04)
≥55	0.83 (0.68, 1.01)	0.89 (0.76, 1.05)
Education		NS
College/postgraduate	1.20 (1.00, 1.32)	
Some college/associate degree	1.08 (0.98, 1.18)	
High school or GED	Referent	
Less than high school	0.74 (0.55, 1.00)	
Tested for HIV, past 12 months		
Yes	1.37 (1.28, 1.47)	1.07 (1.02, 1.14)
No	Referent	Referent
Number of MSPs, past 12 months		
1–2	Referent	Referent
3–5	1.18 (1.09, 1.29)	1.28 (1.18, 1.40)
>5	1.30 (1.20, 1.39)	1.33 (1.23, 1.44)
Had UAI with MSP, past 12 months[c]		NS
Yes	0.91 (0.85, 0.96)	
No	Referent	

[a]Among men who reported having anal sex in the past 12 months

[b]Includes Asian/Pacific Islander, Native American/Alaska Native, multiracial, other, and prefer not to answer

[c]Not included as a variable in the multivariate log binomial model of the association between select characteristics and the use of free condoms

MSM = men who have sex with men

HIV = human immunodeficiency virus

APR = adjusted prevalence ratio

CI = confidence interval

NS = not significant

GED = general equivalency diploma

MSP = male sex partner

UAI = unprotected anal intercourse

have been limited. Further, relative to in-person interviews, responses to sensitive questions in computerized interviews may be less susceptible to socially describable bias.[25] Additionally, participants in the study were not representative of MSM who use social networking sites or MSM in the U.S., and we have previously characterized the potential selection and retention biases among MSM recruited into online surveys.[26] A further selection bias may have been introduced due to the fact that the condom questions appeared in the final section of the survey, and less than half of our study population responded to the questions of interest. An analysis of the participants who did and did not complete the survey revealed that those participants who completed the survey were not representative of all consenting participants. Additionally, because this study relied on self-reported characteristics of participants, misclassification of race/ethnicity, age, or other respondent characteristics may have occurred. There was also the potential for recall bias, as we asked participants to report on their acquisition and use of free condoms from the past year. Further, we did not ask participants where they received free condoms; this information may have been useful in understanding where MSM are able to access free condoms. Also, we cannot exclude the possibility that free condoms that were received actually displaced condoms that would have otherwise been purchased by respondents, so the impact of condom distribution on increasing condom use was not evaluable in our study. Finally, it is possible that condom users in our population were more likely to pick up free condoms than men who do not use condoms; therefore, we do not assert causality based on our analysis.

CONCLUSIONS

The results of our study may provide guidance in the development and implementation of free condom distribution programs. First, our results suggest that distributed condoms are reportedly used and, although the relationship may not be causal, that men who reported acquiring free condoms were less likely to report UAI. Further, men with more male sex partners were more likely than those with fewer partners to both acquire and use free condoms. Second, our results suggest that receiving an HIV test was associated with both acquisition and use of free condoms. If causal, this association could represent an added benefit to the counseling and actual HIV testing that occurs during the session, and further emphasizes the importance of promoting HIV testing with counseling for MSM. Finally, we identified that, overall, a smaller proportion of our Internet-using MSM population reported acquiring free condoms compared with MSM previously sampled from venues, suggesting that additional outreach to venues other than where MSM congregate (e.g., commercial pharmacies/drug stores, grocery stores) may be beneficial. Because more than two-thirds of our study population indicated using the Internet to meet a sex partner in the past 12 months and were no more likely to acquire or use free condoms compared with men who did not use the Internet to meet a sex partner, the implementation of an Internet-based free condom ordering system may provide an opportunity to obtain free condoms for those MSM who do not frequent physical venues. Such a Web-based condom ordering system has been developed by the NYC DOHMH, but the distribution is limited to health and social service organizations, and is currently not available to individuals.[13] Although this type of system would require extensive resources to operate, it would have the potential to reach a large population of MSM—including those residing outside metropolitan areas and those who do not typically access venues where condoms are distributed. Alternatively, online resources that provide locations where individuals may locate free condoms may also be of benefit. These programs, such as one in New York City,[27] may be especially relevant in dense urban areas.

Condom distribution programs are a mainstay of HIV prevention programs in the U.S. but are difficult to evaluate aside from process measures. Despite the limitations of our analysis, we have collected data from a large, geographically diverse group of MSM about coverage of condom distribution and use of distributed condoms. Given the size of national investments in condom distribution, it would be advisable to strengthen the understanding of the impact of such programs. Triangulation of data from multiple, complementary sources would result in a richer understanding of these programs and in clearer understandings of how to leverage existing resources. In the meantime, according to our data, condom distribution programs appear to reach appropriately high-risk men, and a substantial majority of distributed condoms are reported to be used. This finding suggests that such programs should be retained as a part of a comprehensive HIV prevention approach for MSM.[28]

This research was supported by grants from the National Institute on Minority Health and Health Disparities (NIMHD) (RC1MD004370) and the Emory Center for Acquired Immunodeficiency Syndrome Research (CFAR) (P30 AI050409). The findings and conclusions in this article are those of the authors

and do not necessarily represent the views of NIMHD or the Emory CFAR. This study was reviewed and approved by the Institutional Review Board of Emory University.

The authors thank Nicole Luisi for data management support and Adam Carpenter for editorial support.

REFERENCES

1. Centers for Disease Control and Prevention (US). HIV surveillance report: diagnoses of HIV infection and AIDS in the United States and dependent areas, 2010. Atlanta: CDC; March 2012. Also available from: URL: http://www.cdc.gov/hiv/topics/surveillance/resources/reports [cited 2012 May 8].
2. Centers for Disease Control and Prevention (US). HIV among gay and bisexual men. May 2013 [cited 2013 Apr 16]. Available from: URL: http://www.cdc.gov/hiv/topics/msm/pdf/msm.pdf
3. Sullivan PS, Wolitski RJ. HIV infection among gay and bisexual men. In: Wolitski R, Stall R, Valdiserri RO, editors. Unequal oppportunity: health disparities affecting gay and bisexual men in the United States. New York: Oxford University Press; 2008. p. 220-47.
4. Additional recommendations to reduce sexual and drug abuse-related transmission of human T-lymphotropic virus type III/lymphadenopathy-associated virus. MMWR Morb Mortal Wkly Rep 1986;35(10):152-5.
5. Update: barrier protection against HIV infection and other sexually transmitted diseases. MMWR Morb Mortal Wkly Rep 1993;42(30):589-91, 597.
6. Varghese B, Maher JE, Peterman TA, Branson BM, Steketee RW. Reducing the risk of sexual HIV transmission: quantifying the per-act risk for HIV on the basis of choice of partner, sex act, and condom use. Sex Transm Dis 2002;29:38-43.
7. Weller S, Davis K. Condom effectiveness in reducing heterosexual HIV transmission. Cochrane Database Syst Rev 2002;(1):CD003255.
8. Warner DL, Hatcher RA. A meta-analysis of condom effectiveness in reducing sexually transmitted HIV. Soc Sci Med 1994;38:1169-70.
9. The White House (US), Office of National AIDS Policy. National HIV/AIDS strategy for the United States. Washington: The White House; 2010. Also available from: URL: http://www.aids.gov/federal-resources/policies/national-hiv-aids-strategy/nhas.pdf [cited 2011 Apr 27].
10. Cohen D, Scribner R, Bedimo R, Farley TA. Cost as a barrier to condom use: the evidence for condom subsidies in the United States. Am J Public Health 1999;89:567-8.
11. Moore SG, Dahl DW, Gorn GJ, Weinberg CB. Coping with condom embarrassment. Psychol Health Med 2006;11:70-9.
12. Cohen DA. Condom availability for HIV/STD prevention. AIDS Patient Care STDS 1999;13:731-7.
13. Renaud TC, Bocour A, Irvine MK, Bernstein KT, Begier EM, Sepkowitz KA, et al. The free condom initiative: promoting condom availability and use in New York City. Public Health Rep 2009;124:481-9.
14. Cohen DA, Farley TA, Bedimo-Etame JR, Scribner R, Ward W, Kendall C, et al. Implementation of condom social marketing in Louisiana, 1993 to 1996. Am J Public Health 1999;89:204-8.
15. Bedimo AL, Pinkerton SD, Cohen DA, Gray B, Farley TA. Condom distribution: a cost-utility analysis. Int J STD AIDS 2002;13:384-92.
16. Centers for Disease Control and Prevention (US). Condom distribution as a structural level intervention. October 2010 [cited 2013 May 15]. Available from: URL: http://www.cdc.gov/hiv/pdf/prevention_programs_condom_distribution.pdf
17. Rhodes SD, Hergenrather KC, Yee LJ, Wilkin AM, Clarke TL, Wooldredge R, et al. Condom acquisition and preferences within a sample of sexually active gay and bisexual men in the southern United States. AIDS Patient Care STDS 2007;21:861-70.
18. Sanchez T, Finlayson T, Drake A, Behel S, Cribbin M, Dinenno E, et al. Human immunodeficiency virus (HIV) risk, prevention, and testing behaviors—United States, National HIV Behavioral Surveillance System: men who have sex with men, November 2003–April 2005. MMWR Surveill Summ 2006;55(6):1-16.
19. Prevalence and awareness of HIV infection among men who have sex with men—21 cities, United States, 2008. MMWR Morb Mortal Wkly Rep 2010;59(37):1201-7.
20. SAS Institute, Inc. SAS®: Version 9.2 for Windows. Cary (NC): SAS Institute, Inc.; 2009.
21. Census Bureau (US). Census regions and divisions of the United States [cited 2012 Oct 21]. Available from: URL: https://www.census.gov/geo/www/us_regdiv.pdf
22. Marks G, Crepaz N, Senterfitt JW, Janssen RS. Meta-analysis of high-risk sexual behavior in persons aware and unaware they are infected with HIV in the United States: implications for HIV prevention programs. J Acquir Immune Defic Syndr 2005;39:446-53.
23. Catania JA, Gibson DR, Chitwood DD, Coates TJ. Methodological problems in AIDS behavioral research: influences on measurement error and participation bias in studies of sexual behavior. Psychol Bull 1990;108:339-62.
24. Gray RH. Use of hormonal contraceptives and risk of HIV-1 transmission. Lancet Infect Dis 2012;12:507; author reply 510-1.
25. Kissinger P, Rice J, Farley T, Trimm S, Jewitt K, Margavio V, et al. Application of computer-assisted interviews to sexual behavior research. Am J Epidemiol 1999;149:950-4.
26. Sullivan PS, Khosropour CM, Luisi N, Amsden M, Coggia T, Wingood GM, et al. Bias in online recruitment and retention of racial and ethnic minority men who have sex with men. J Med Internet Res 2011;13:e38.
27. New York City Department of Health and Mental Hygiene. Site locator [cited 2013 Apr 16]. Available from: URL: https://a816-healthpsi.nyc.gov/DispensingSiteLocator/mainView.do
28. Sullivan PS, Carballo-Diéguez A, Coates T, Goodreau SM, McGowan I, Sanders EJ, et al. Successes and challenges of HIV prevention in men who have sex with men. Lancet 2012;380:388-99.

Improvements in Timeliness Resulting from Implementation of Electronic Laboratory Reporting and an Electronic Disease Surveillance System

Erika Samoff, PhD, MPH[a,b]
Mary T. Fangman, MSPH[a]
Aaron T. Fleischauer, PhD[c,d]
Anna E. Waller, ScD[e]
Pia D.M. MacDonald, PhD, MPH[a,f]

ABSTRACT

Objectives. Electronic laboratory reporting (ELR) reduces the time between communicable disease diagnosis and case reporting to local health departments (LHDs). However, it also imposes burdens on public health agencies, such as increases in the number of unique and duplicate case reports. We assessed how ELR affects the timeliness and accuracy of case report processing within public health agencies.

Methods. Using data from May–August 2010 and January–March 2012, we assessed timeliness by calculating the time between receiving a case at the LHD and reporting the case to the state (first stage of reporting) and between submitting the report to the state and submitting it to the Centers for Disease Control and Prevention (second stage of reporting). We assessed accuracy by calculating the proportion of cases returned to the LHD for changes or additional information. We compared timeliness and accuracy for ELR and non-ELR cases.

Results. ELR was associated with decreases in case processing time (median = 40 days for ELR cases vs. 52 days for non-ELR cases in 2010; median = 20 days for ELR cases vs. 25 days for non-ELR cases in 2012; both $p<0.001$). ELR also allowed time to reduce the backlog of unreported cases. Finally, ELR was associated with higher case reporting accuracy (in 2010, 2% of ELR case reports vs. 8% of non-ELR case reports were returned; in 2012, 2% of ELR case reports vs. 6% of non-ELR case reports were returned; both $p<0.001$).

Conclusion. The overall impact of increased ELR is more efficient case processing at both local and state levels.

[a]The University of North Carolina at Chapel Hill, Gillings School of Global Public Health, North Carolina Institute for Public Health, Chapel Hill, NC

[b]Current affiliation: Durham County Department of Public Health, Durham, NC

[c]Centers for Disease Control and Prevention, Office of Public Health Preparedness and Response, Atlanta, GA

[d]North Carolina Division of Public Health, Raleigh, NC

[e]The University of North Carolina at Chapel Hill, Department of Emergency Medicine, Carolina Center for Health Informatics, Chapel Hill, NC

[f]Social & Scientific Systems, Inc., Durham, NC

Address correspondence to: Erika Samoff, PhD, MPH, Durham County Department of Public Health, 414 E. Main St., Durham, NC 27701; tel. 919-560-7833; fax 919-328-6252; e-mail <esamoff@dconc.gov>.

Electronic laboratory reporting (ELR) has been shown to reduce the time interval between diagnosis of reportable communicable diseases and reporting these cases to public health agencies.[1–4] In addition, some data fields are more likely to be completed when reports are made via ELR.[1–3] Ideally, increases in electronic data transfer would decrease the processing burden within public health agencies; at the very least, the burden of data entry should be reduced. However, automated reporting increases the total number of cases reported[1–3,5] and can increase the number of reports not meeting reportable disease case definitions,[5,6] thereby potentially increasing the time required for case processing for local health department (LHD) staff. In addition, ELR does not capture important case information, such as treatment details, which need to be added to case reports following investigation by local or state personnel.

The proportion of case reports received by ELR is increasing with the support of the 2009 Health Information Technology for Economic and Clinical Health (HITECH) Act.[7] Increases in the use of electronic health records[8,9] will also increase the potential for electronic transfer of laboratory testing data to public health. However, public health funding is not increasing.[10] There is little published information on whether the increasing number of cases will require additional processing time and resources; therefore, it is difficult to predict the impact of increased ELR on the public health infrastructure.

North Carolina implemented the North Carolina Electronic Disease Surveillance System (NC EDSS) during 2007–2008, including ELR from the state public health laboratory and one large private laboratory. The increased case volume from these laboratories, in addition to the limited workforce available to process cases, resulted in a backlog of approximately 18,000 cases. From 2010 to 2012, the North Carolina Division of Public Health (NCDPH) staff made a concerted effort to address the backlog of reportable disease cases accumulated at health departments at the local and state level. During this period, the North Carolina Preparedness and Emergency Response Research Center was conducting an evaluation of electronic disease surveillance systems used in North Carolina.

To assess the effect of ELR on case reporting, we evaluated data from the NC EDSS. We evaluated these data for two periods: 2010, when the backlog created by the addition of ELR was large; and 2012, when the system was more mature and the backlog was eliminated. We used these data to test the hypothesis that ELR decreases the case-processing burden, by comparing case report processing timeliness and accuracy for reportable disease cases delivered by ELR and non-ELR methods to North Carolina LHDs during these two time periods.

METHODS

In North Carolina, reportable communicable disease case data are captured in the NC EDSS using the Maven software system.[11] Data on cases submitted by ELR and non-ELR means were received from NCDPH surveillance staff. During the analysis period, ELR cases entered the NC EDSS by electronic transmission from two laboratories: the State Laboratory of Public Health and the Laboratory Corporation of America (LabCorp). Non-ELR cases, submitted by faxed and/or mailed reports from laboratories and clinicians, were entered in the system by local and state public health agency staff. We analyzed NC EDSS data from May–August 2010 and January–March 2012 from all North Carolina counties. Data on tuberculosis, syphilis, and human immunodeficiency virus cases were excluded from analysis because these cases are handled differently.

Using these data, we assessed timeliness by calculating the time between receiving a case at the LHD and reporting the case to NCDPH (first stage of reporting) and between submitting the case report to NCDPH and submitting the report to the Centers for Disease Control and Prevention (CDC) (second stage of reporting). We assessed reporting accuracy by calculating the proportion of cases returned from NCDPH to the LHD for correction or additional data collection. We compared ELR and non-ELR reporting by disease for diseases for which more than 10 cases were reported and cases were reported by both methods. We used Mann-Whitney tests to identify significant differences in median evaluated time intervals and *z*-scores to identify significant differences in proportions of cases returned to LHDs. All data analysis was performed using SAS® version 9.2.[12]

RESULTS

Data

The analysis datasets contained 11,560 cases reported in 2010 and 16,095 cases reported in 2012. While data from 2010 were obtained 6–9 months following the date cases were reported to public health, data from 2012 were obtained closer to the date of initial report to public health. (The longest processing period possible for 2012 cases in this dataset was 105 days.) We created a comparison 2010 database similarly limited to 105 days that excluded some cases that took longer than

105 days for case processing (n=4,419 cases, 28%). Most cases in both datasets were sexually transmitted disease (STD) cases (94% of the 2012 dataset, 91% of the 2010 comparison dataset, and 86% of the cases excluded from the 2010 comparison dataset). Cases reported by ELR comprised 38% of total cases in the 2010 dataset (n=4,345) and 38% of cases in the 2012 dataset (n=6,129).

Overall timeliness

As shown in Figure 1a, in 2010, the median number of days required for all public health processing for ELR cases (n=40) was fewer than for non-ELR cases (n=52) ($p<0.001$). In 2012, the overall case-processing time was greatly reduced. These gains in timeliness were due to the combination of ELR, elimination of the backlog of cases waiting to be processed, and a technical assistance effort focused on improving LHD case processing. ELR cases reported in 2012 were also processed more quickly than non-ELR cases (20 vs. 25 days, respectively, $p<0.001$) (Figure 1b).

Local and state health department processing timeliness and accuracy

Overall processing time can be separated into LHD processing and state processing periods. In 2010, ELR cases required less time for LHD processing than did non-ELR cases. The processing time required prior to reporting to the state health department in 2010 was a median of nine days for ELR cases and 14 days for non-ELR cases (p=0.08) (Figure 1a). In 2012, there was no difference in LHD case-processing time (median = 7 and 8 days for ELR and non-ELR cases, respectively, p=0.31) (Figure 1b).

Following LHD processing, cases were submitted to the state public health agency. After receipt at the state, some records were returned to the LHD due to incorrect or missing information. ELR records were less likely than non-ELR records to be returned. In 2010, 2% of ELR records vs. 8% of non-ELR records were returned (Figure 1a); in 2012, 2% and 6% of ELR and non-ELR records, respectively, were returned (both $p<0.001$) (Figure 1b). Similarly, ELR case reports were returned to the LHD and then resubmitted to the state in less time than non-ELR records (2010 medians: 22 days for ELR vs. 41 days for non-ELR, p=0.33; 2012 medians: 12 days for ELR vs. 18 days for non-ELR, p=0.31) (Figures 1a and 1b). We also assessed the difference in accuracy seen in the full 2010 dataset. In this dataset, with more case follow-up time, 4% of ELR cases vs. 14% of non-ELR cases were returned ($p<0.001$) (data not shown).

The median interval between receipt of the case at the state public health department with the correct information and submission to CDC was also shorter for ELR records than for non-ELR records in 2010 (median = 23 days vs. 30 days, $p<0.001$) (Figure 1a) and in 2012 (median = 11 days vs. 16 days, $p<0.001$) (Figure 1b).

Case processing by disease

The major gains seen in case-processing timeliness for ELR cases were for STD case reports (Table 1). In 2010, Chlamydia and gonorrhea cases reported by ELR required 40 days for processing vs. 56 days for non-ELR cases ($p<0.0001$). In 2012, the pattern was similar (20 days vs. 25 days for ELR and non-ELR cases, respectively, $p<0.0001$). However, the processing time for vaccine-preventable diseases did not differ significantly by reporting method (ELR vs. non-ELR) (Table 1). Total case-processing time was actually significantly longer for ELR reports for two diseases with complex case definitions, *Haemophilus influenza* infection (p=0.05) and Lyme disease (p=0.07) (Table 2).

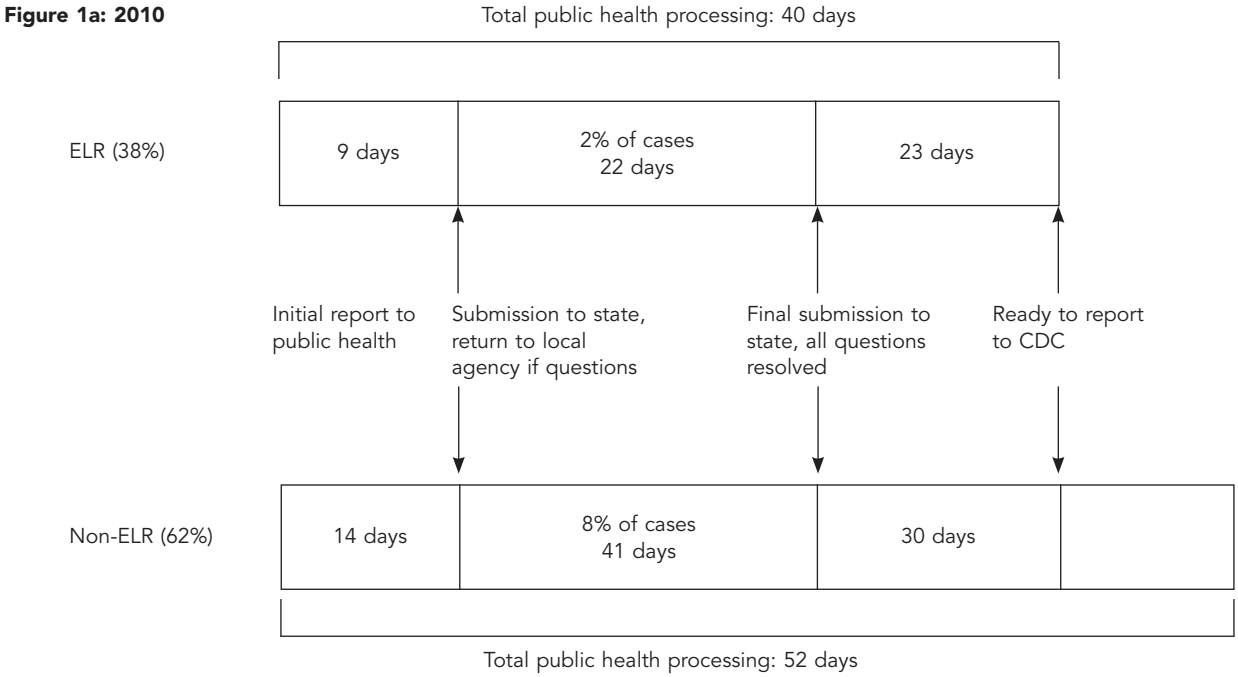
DISCUSSION

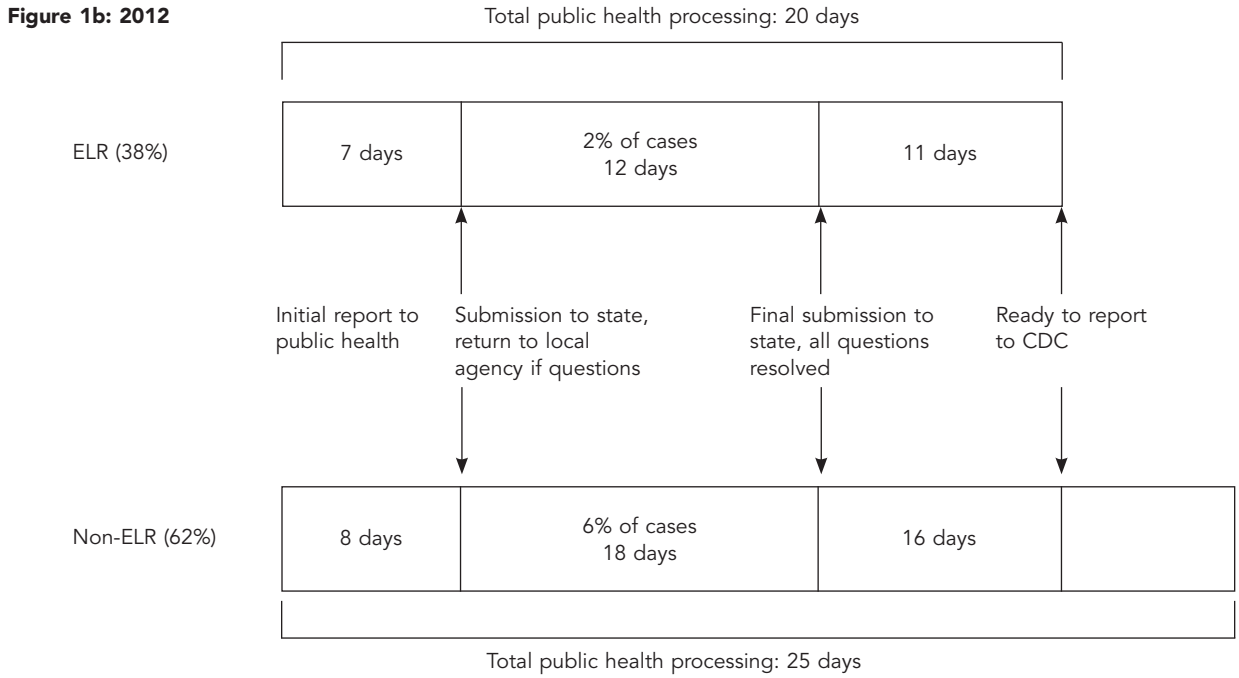
These findings suggest that ELR was associated with reduced time for both stages of case processing—reporting from LHDs to the state and submitting the case report to CDC. Cases submitted by ELR were also processed with fewer inaccuracies, resulting in fewer cases being returned to the LHD. Our data suggest that despite the increase in cases handled in 2012, reporting by ELR allowed an overall increase in timeliness for all cases.

Following implementation of ELR in 2007, the number of cases reported to the state increased.[13] Because the staff time available for surveillance duties was limited, in the years immediately following implementation it was not possible to process all case reports in a timely manner, and lower-priority cases accumulated. However, over time, and as efficiency with NC EDSS improved, NCDPH was able to direct staff resources toward working with LHD staff to enter these cases from 2010 to 2011; as a result, case reports were processed much closer to the initial date of report to public health. Therefore, although the increase in cases initially slowed case reporting, gains in efficiency attributed in part to ELR were seen at both local and state levels, and case reporting timeliness improved greatly (Personal communication, Emily Lamb, NCDPH, December 2012).

Conversations with staff participating in the implementation of the electronic system suggest that timeliness gains were due to two major factors. First, case

Figure 1. Timeline (median days) of public health processing of a reportable disease or condition at state and local public health agencies by ELR and non-ELR: North Carolina, May–August 2010 and January–March 2012





ELR = electronic laboratory reporting

CDC = Centers for Disease Control and Prevention

Table 1. Timeliness and accuracy of electronic laboratory reporting by reportable disease category: North Carolina, May–August 2010 and January–March 2012

	Number of cases		*Percent returned to LHD*		*Median days of public health processing*	
Disease category	*ELR*	*Non-ELR*	*ELR*	*Non-ELR*	*ELR*	*Non-ELR*
2010						
Sexually transmitted diseases	4,009	6,528	2	8	40	56
Vaccine-preventable diseases	37	33	5	15	18	25
Other communicable disease	299	634	5	9	39	45
2012						
Sexually transmitted diseases	5,808	7,770	2	6	20	25
Vaccine-preventable diseases	120	155	13	4	20	28
Other communicable disease	201	453	1	5	18	16

LHD = local health department

ELR = electronic laboratory reporting

Table 2. Timeliness and accuracy of electronic laboratory reporting by reportable disease: North Carolina, January–March 2012

	Number of cases		*Accuracy (percent returned to LHD for corrections or questions)*			*Timeliness (median days from receipt at LHD to ready to report to CDC)*		
Reportable condition[a]	*ELR*	*Non-ELR*	*ELR*	*Non-ELR*	P-*value*	*ELR*	*Non-ELR*	P-*value*
Campylobacteriosis	27	123	7	4	0.54	42	48	0.06
Chlamydia trachomatis infection	3,176	4,016	2	9	<0.001	40	57	<0.001
Chronic hepatitis B	19	19	5	32	0.04	10	17	0.14
Cryptosporidiosis	2	20	0	15	0.08	28	20	0.78
Ehrlichiosis (HGA)	16	1	0	0	NA	18	19	0.98
Ehrlichiosis (HME)	32	11	6	27	0.18	26	22	0.50
Entero-hemorrhagic *Escherischia coli* infection	7	12	0	17	0.17	42	49	0.30
Gonorrhea infection	803	1,609	2	8	<0.001	40	51	<0.001
Haemophilus influenza infection	8	31	13	23	0.54	17	12	0.05
Legionellosis	8	12	25	0	0.17	23	27	0.39
Lyme disease	23	6	4	33	0.23	38	26	0.07
Malaria	2	9	50	0	0.50	37	48	0.61
Non-gonococcal urethritis	31	803	6	6	0.96	44	49	<0.001
Pertussis	16	12	0	0	NA	34	57	0.08
Rocky Mountain Spotted Fever rickettsiosis	47	54	0	13	0.01	35	37	0.15
Salmonellosis	111	251	5	8	0.19	47	48	0.07
Shigellosis	12	23	0	4	0.33	48	48	0.42

[a]Conditions for which cases were present in the NC EDSS database but not reported by ELR were arboviral encephalitis (non-West Nile or La Crosse), brucellosis, *Clostridium perfringens* infections, Creutzfeldt-Jakob disease, dengue fever, diphtheria, hepatitis A, perinatal hepatitis B, acute hepatitis, influenza, La Crosse (California) encephalitis, Hansen disease (Leprosy), leptospirosis, measles, pelvic inflammatory disease, pneumococcal meningitis, Q fever, rubella, *Staphylococcus aureus* with reduced susceptibility to vancomycin, invasive group A streptococcal infection, streptococcal toxic shock syndrome, acute typhoid fever, vaccinia, and West Nile virus encephalitis. Some cases, such as hepatitis A, are submitted by ELR but are also submitted by fax and are prioritized for rapid hand entry when the fax arrives (generally, sooner than when the ELR record is received). Therefore, ELR is not the initial method of receipt for these cases.

LHD = local health department

CDC = Centers for Disease Control and Prevention

ELR = electronic laboratory reporting

HGA = human granulocytic anaplasmosis

NA = not applicable

HME = human monocytic ehrlichiosis

NC EDSS = North Carolina Electronic Disease Surveillance System

reports received by ELR were more accurate; therefore, they required less follow-up to obtain correct information. Second, the electronic system allowed review of any case during processing, and had comment fields embedded in case reports. This capability resulted in improved insight into case processing, and allowed state and local health department staff to target subsets of case reports for which efficiency could be improved.

The time required to process some diseases with complex case definitions was increased for cases reported by ELR. These diseases were characterized by a requirement for multiple test results to make a case reportable. However, receipt of a single laboratory test result by ELR resulted in a database record requiring attention from LHD communicable disease staff (i.e., an open case). These cases would then remain open until all results were assembled. In contrast, non-ELR reports were more likely to include the results of more than one test; therefore, they required less processing time. This issue could be addressed by modifications to the electronic surveillance system to limit notification of LHD communicable disease staff (that is, limit "opening a case") to cases with sufficient information assembled.

Limitations

Our analysis of ELR was subject to three major limitations. First, data were captured during the summer months in 2010 and winter months in 2012; given seasonal patterns of disease, some diseases for which ELR altered reporting, such as Lyme disease, represented different proportions of total cases in the two databases. However, because improvements in timeliness were seen for most reportable diseases, these differences were not responsible for the overall findings presented. Second, because ELR in North Carolina is limited to two laboratories, ELR results reflect the tests performed at these facilities. However, all reportable diseases are reported by these laboratories. Finally, timeliness comparisons were based on a limited time window. Although the comparison presented is valid, the results are likely to be underestimates of the true processing times.

CONCLUSION

ELR implementation is associated with meaningful decreases in case report processing time. These findings suggest that the expansion of ELR statewide and nationally to include hospitals and commercial laboratories may support more efficient case processing at local and state health departments.

The authors thank Lauren DiBiase of the University of North Carolina (UNC) and Robert G. Pace of the North Carolina Division of Public Health for their valuable insight on these data. This research was carried out by the North Carolina Preparedness and Emergency Response Research Center (NCPERRC), which is part of the UNC Center for Public Health Preparedness at the UNC-Chapel Hill Gillings School of Global Public Health and was supported by the Centers for Disease Control and Prevention (CDC) grant #1PO1 TP 000296. The contents of this article are solely the responsibility of the authors and do not necessarily represent the official views of CDC. Additional information can be found at http://cphp.sph.unc.edu/ncperrc.

This work was exempted from review by the Institutional Review Board of UNC-Chapel Hill.

REFERENCES

1. Effler P, Ching-Lee M, Bogard A, Leong MC, Nekomoto T, Jernigan D. Statewide system of electronic notifiable disease reporting from clinical laboratories: comparing automated reporting with conventional methods [published erratum appears in JAMA 2000;283:2937]. JAMA 1999;282:1845-50.
2. Nguyen TQ, Thorpe L, Makki HA, Mostashari F. Benefits and barriers to electronic laboratory results reporting for notifiable diseases: the New York City Department of Health and Mental Hygiene experience. Am J Public Health 2007;97 Suppl 1:S142-5.
3. Overhage JM, Grannis S, McDonald CJ. A comparison of the completeness and timeliness of automated electronic laboratory reporting and spontaneous reporting of notifiable conditions. Am J Public Health 2008;98:344-50.
4. Panackal AA, M'ikanatha NM, Tsui FC, McMahon J, Wagner MM, Dixon BW, et al. Automatic electronic laboratory-based reporting of notifiable infectious diseases at a large health system. Emerg Infect Dis 2002;8:685-91.
5. Effect of electronic laboratory reporting on the burden of Lyme disease surveillance—New Jersey, 2001–2006. MMWR Morb Mortal Wkly Rep 2008;57(2):42-5.
6. Macomber KE, Lewis E. The implications of syphilis electronic laboratory reporting on a morbidity-based disease reporting system. Presented at the 2008 National STD Prevention Conference; 2008 Mar 10–13; Chicago.
7. Public Law 111-5, 123 Stat 226 (2009).
8. Jha AK, DesRoches CM, Kralovec PD, Joshi MS. A progress report on electronic health records in U.S. hospitals. Health Aff (Millwood) 2010;29:1951-7.
9. Department of Health and Human Services (US). More than 100,000 health care providers sign up to adopt electronic health records through their regional extension centers; [press release] 2011 Nov 17 [cited 2012 Jun 20]. Available from: URL: http://www.hhs.gov/news/press/2011pres/11/20111117a.html
10. National Association of County and City Health Officials. Local health department job losses and program cuts: findings from January/February 2010 survey [cited 2013 Mar 22]. Available from: URL: http://www.naccho.org/topics/infrastructure/lhdbudget/upload/Job-Losses-and-Program-Cuts-5-10.pdf
11. Consilience Software. Maven. Austin (TX): Consilience Software; 2007.
12. SAS Institute, Inc. SAS®: Version 9.2. Cary (NC): SAS Institute, Inc.; 2012.
13. North Carolina Department of Health and Human Services. Facts and figures: North Carolina communicable disease reports [cited 2012 Jul 10]. Available from: URL: http://epi.publichealth.nc.gov/cd/figures.html#cds

Global Health Matters

In this article, Sommer makes an important point that the age of menarche is overlooked as a key indicator in research and practice in low-income countries. As the author indicates, the absence of systematic national data collection is very much a missed occasion for trend analysis of the population, as well as a better appreciation of the inequities within the country. These data would also provide government officials, health-care providers, and researchers with valuable information on nutritional status and sexual and reproductive health.

Mark Gregory Robson, PhD, DrPH
Dean of Agricultural and Urban Programs
Rutgers, The State University of New Jersey, New Brunswick, NJ

MENARCHE: A MISSING INDICATOR IN POPULATION HEALTH FROM LOW-INCOME COUNTRIES

Marni Sommer, DrPH, MSN

Evidence from high-income countries suggests that early onset of menarche (i.e., the first menstrual cycle) may be linked to early sexual initiation, the uptake of alcohol and other substances, and premature school dropout.[1,2] Such potential linkages have yet to be adequately explored in low-income countries but have implications for girls' health and population health outcomes. National country data, research studies, and large national surveys, including demographic and health surveys (DHSs) and multiple indicator cluster surveys (MICSs), have generally not included this important measure of a girl's nutritional status, developmental progress, and reproductive health. Given the public health importance of tracking the age of menarche within individual girls and across differing socioeconomic populations, the global health community is overdue to capture this important measure.

CURRENT LACK OF MENARCHE DATA

Across low-income regions of the world, there is almost no systematic effort to monitor the socio-epidemiology of menarche. This lack of monitoring represents a missed opportunity for shaping public health interventions targeting girls transitioning into young womanhood, and for deepening the understanding of the relationship between socioeconomic inequalities and adolescent girls' nutritional status, risk of unintended pregnancy, and risk of sexually transmitted infections (STIs).

The onset of menstruation is a key indicator in pubertal development, serving as a biological and social measure of a girl's healthy transition from childhood into adolescence or young adulthood. From a physiological perspective, the age of menarche serves as an important clinical indicator of a girl's physical maturation, nutritional status, and reproductive health. From a social perspective, particularly in many low-income countries, the onset of menses has traditionally served as a symbol of fertility, sexual readiness, and marriageability, depending on the local cultural context.

From a public health perspective, trends in population data on the average age of menarche can indicate nutritional status of the population, including improved nutrition, malnutrition, or anemia. Studies conducted in Sweden, the United States, Portugal, and other high-income countries have suggested that a higher gain in body mass index during childhood is related to an earlier onset of puberty.[3–5] In Bangladesh, childhood and adolescent stunting remains an important determinant of age of menarche.[6] In India, 60% of adolescent girls are reported to have nutritional anemia.[7] Differences in the average age of menarche within countries, including the rural vs. urban divide, can serve as an indicator of socioeconomic inequalities and their implications for adolescent health.[8] In a three-country study in Asia, researchers found that girls were reaching menarche earlier in more modern and urban settings, a transition that has been shown to correlate with earlier initiation of sexual activity.[9]

Despite the numerous important functions served locally and globally by capturing menarche data at a national or large-scale level, the measurement of menarche has been overlooked in almost all of the significant surveys conducted in low-income countries, including the DHS (with a few exceptions), the MICS conducted by the United Nations Children's Fund, and smaller-scale surveys relating to research on family planning, sexual and reproductive health, and human

immunodeficiency virus (HIV) and acquired immunodeficiency syndrome.

PUBLIC HEALTH IMPLICATIONS OF EARLY MENARCHE

The importance of collecting data on the average age of menarche is supported by patterns in risky social behavior and vulnerability that have been empirically documented in high-income countries. There is increasing evidence that the early onset of menses is linked to risky behaviors, such as early initiation of (unsafe) sexual relations; uptake of drugs, tobacco, and alcohol; and premature school dropout.[1,2] Whether similar patterns exist across low-income countries has not yet been widely explored. A recent study in northern Malawi found that earlier age of menarche was strongly associated with earlier sexual debut, marriage, and lower schooling levels. The latter has important implications given the strong correlation between girls' education and population health. In Malawai, the proportion of adolescent girls who completed primary school differed by age of menarche: 46% of those who reached menarche before age 14 years completed primary school, while 70% of the girls who reached menarche after 16 years of age completed primary school.[10] The difference was only partially explained by the age of sexual debut. The authors argue that age of menarche may be a major overlooked factor influencing both sexual debut and schooling, with implications pertaining to risk of infection with HIV. There is also growing evidence that the onset of menses may impact girls' schooling due to challenges concerning menstrual hygiene management, with limited water and sanitation facilities in schools.[11–13]

In countries where fertility pressure is high and pubertal development serves as a symbol of sexual readiness, understanding the potential linkages to age of menarche is critical for adolescent girls' sexual and reproductive health. A growing number of low-income countries, such as Ethiopia, Senegal, Ghana, Bangladesh, and Thailand, are starting to measure menarche, usually among small samples of the rural or urban population.[3,14–17] They have generally concluded that the average age of menarche is dropping; however, in some countries, the reported average age remains high, particularly in rural areas. Zegeye et al. found the average age of menarche for girls in rural Ethiopia was 15.8 years.[14] In contrast, Pawloski et al. found that peri-urban Thai girls had an average age of menarche of 11.7 years, the latter having implications about increasing nutrition and socioeconomic status.[15] There remain, however, no national-level or large survey data that can provide a truly valid reference measure for most low-income countries.

PUBLIC HEALTH CONSEQUENCES OF LATE MENARCHE

The significance of capturing data on the average age of menarche has both clinical and public health utility. From a clinical perspective, as emphasized in a recent report issued by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists, the menstrual cycle should be viewed as a vital sign or "important assessment tool of normal development and the exclusion of pathological conditions" for growing girls.[18] The authors highlight the insufficient knowledge most parents, girls, adolescents, and clinicians have of normal bleeding among girls transitioning through adolescence, and the importance of providing guidance to families and pediatricians. In low-income countries, particularly in sub-Saharan Africa, where adolescent girls continue to be under tremendous pressure to demonstrate their fertility,[19] a delayed onset of menses may cause tremendous concern within the family. In contrast, an early onset of menarche has shown to result in a girl's punishment if her parents interpret it as a sign of promiscuity, or isolation and seclusion away from the family, as has been evidenced in both sub-Saharan Africa and Asia (Unpublished report for the Bill & Melinda Gates Foundation. Sommer M. Global review of menstrual beliefs and behaviors in low-income countries: implications for menstrual hygiene management. 2011).[20,21] Although many girls in low-income countries, particularly those in rural settings, do not have regular interaction with a clinician, increased awareness about normal (and abnormal) patterns of the menstrual cycle could diminish unnecessary anxiety among girls and families, while also capturing pathologies that arise.

From a public health perspective, data on the average age of menarche are essential for understanding the nutritional status of the population and the socioeconomic divide between rural and urban population health. As data from high-income countries and Malawi suggest, they also have implications for understanding patterns in sexual initiation, vulnerability to HIV and other STIs, and schooling outcomes. Such national-level menarche data could also contribute to a global understanding of trends in overweight and obesity, if the age of menarche is found to be dropping among certain country populations.

A CALL FOR MENARCHE DATA

This absence of systematic national data collection represents a missed opportunity. Knowing the average age of menarche within populations would allow for public health trend analysis, clinical application, and a deeper understanding of socioeconomic inequalities within country populations. Important examples come from the U.S. population, in which researchers use menarche data—perceived to be the least subjective of the pubertal indicators—from the National Health and Nutrition Examination Survey to understand pubertal trends in varying populations of girls.[22] There is a need for large research studies, or the large-scale national-level surveys such as the DHS and MICS, to begin including menarche as a key indicator within their questionnaires. Although recall bias can be a challenge, both surveys target members of the population who are not too far away from menarche (e.g., the DHS targets 15-year-olds), and such biases can be adjusted for in analysis. In addition, consideration should be given to local taboos around sharing the onset of menses amongst certain cultural and social contexts.

Acquiring national-level data on the average age of menarche would provide critical information for country-level nutritionists, sexual and reproductive health experts, and experts working on the continued gender gap in education. In addition, research is needed in low-income contexts to better understand the potential vulnerabilities—from sexual initiation to school interruption to the uptake of substances, as has been found in high-income countries—of girls who reach menarche early. Lastly, the global-level health and development community would greatly benefit from the increased availability of quality data on age of menarche given their efforts to track trends in socioeconomic and nutritional status in regions around the world.

Marni Sommer is an Assistant Professor of Sociomedical Sciences in the Mailman School of Public Health at Columbia University in New York, New York.

Address correspondence to: Marni Sommer, DrPH, MSN, RN, Columbia University, Mailman School of Public Health, 722 W. 168th St., Room 540, New York, NY 10032; tel. 212-305-1826; fax 212-342-1285; e-mail <ms2778@columbia.edu>.

©2013 Association of Schools and Programs of Public Health

REFERENCES

1. Windle M, Grunbaum JA, Elliott M, Tortolero SR, Berry S, Gillilland J, et al. Healthy passages. A multilevel, multi-method longitudinal study of adolescent health. Am J Prev Med 2004;27:164-72.
2. Resnick MD, Bearman PS, Blum RW, Bauman KE, Harris KM, Jones J, et al. Protecting adolescents from harm. Findings from the National Longitudinal Study on Adolescent Health. JAMA 1997;278:823-32.
3. He Q, Karlberg J. BMI in childhood and its association with height gain, timing of puberty, and final height. Pediatr Res 2001;49:244-51.
4. Wang Y. Is obesity associated with early sexual maturation? A comparison of the association in American boys versus girls. Pediatrics 2002;110:903-10.
5. Rebeiro J, Santos P, Duarte J, Mota J. Association between overweight and early sexual maturation among Portuguese boys and girls. Ann Hum Biol 2006;33:55-63.
6. Bosch AM, Willekens FJ, Baqui AH, Van Ginneken JK, Hutter I. Association between age at menarche and early-life nutritional status in rural Bangladesh. J Biosoc Sci 2008;40:223-37.
7. Toteja GS, Singh P, Dhillon BS, Saxena BN, Ahmed FU, Sing RP, et al. Prevalence of anemia among pregnant women and adolescent girls in 16 districts of India. Food Nutr Bull 2006;27:311-5.
8. Jones LL, Griffiths PL, Norris SA, Pettifor JM, Cameron N. Age at menarche and the evidence for a positive secular trend in urban South Africa. Am J Hum Biol 2009;21:130-2.
9. Zabin LS, Emerson MR, Nan L, Chaohua L, Ersheng G, Minh NH, et al. Levels of change in adolescent sexual behavior in three Asian cities. Stud Fam Plann 2009;40:1-12.
10. Glynn JR, Kayuni N, Floyd S, Banda E, Francis-Chizororo M, Tanton C, et al. Age at menarche, schooling, and sexual debut in northern Malawi. PLoS One 2010;5:e15334.
11. Sommer M. Ideologies of sexuality, menstruation, and risk: girls' experiences of puberty and schooling in northern Tanzania. Cult Health Sex 2009;11:383-98.
12. Sommer M, Ackatia-Armah N. The gendered nature of schooling in Ghana: hurdles to girls' menstrual management in school. JENdA 2012;20:63-79.
13. McMahon SA, Winch PJ, Caruso BA, Obure AF, Ogutu EA, Ochari IA, et al. "The girl with her period is the one to hang her head." Reflections on menstrual management among schoolgirls in rural Kenya. BMC Int Health Hum Rights 2011;11:7.
14. Adadevoh SW, Agble TK, Hobbs C, Elkins TE. Menarcheal age in Ghanaian school girls. Int J Gynaecol Obstet 1989;30:63-8.
15. Zegeye DT, Megabiaw B, Mulu A. Age at menarche and the menstrual pattern of secondary school adolescents in northwest Ethiopia. BMC Womens Health 2009;9:29.
16. Pawloski LR, Ruchiwit M, Pakapong Y. A cross-sectional examination of growth indicators from Thai adolescent girls: evidence of obesity among Thai youth? Ann Hum Biol 2008;35:378-85.
17. Simondon KB, Simon I, Simondon F. Nutritional status and age at menarche of Senegalese adolescents. Ann Hum Biol 1997;24:521-32.
18. American Academy of Pediatrics Committee on Adolescence; American College of Obstetricians and Gynecologists Committee on Adolescent Health Care; Diaz A, Laufer MR, Breech LL. Menstruation in girls and adolescents: using the menstrual cycle as a vital sign. Pediatrics 2006;118:2245-50.
19. Wood K, Jewkes R. Blood blockages and scolding nurses: barriers to adolescent contraceptive use in South Africa. Reprod Health Matters 2006;14:109-18.
20. Fehr AE. Stress, menstruation, and school attendance: effects of water access among adolescent girls in South Gondar, Ethiopia. Summary report for CARE Ethiopia. Atlanta: Emory University, Rollins School of Public Health; 2010.
21. Devkota S. The lived experience of menarche in Nepalese adolescents: a phenomenological study. 2011 [cited 2012 Feb 24]. Available from: URL: http://csuchico-dspace.calstate.edu/bitstream/handle/10211.4/386/Sita%20Devkota_thesis.pdf?sequence=1
22. Pescovitz OH, Walvoord EC, editors. When puberty is precocious: scientific and clinical aspects. Totowa (NJ): Humana Press; 2007.

Law and the Public's Health

One of the most important questions in health law concerns how the law can be used as a tool to improve the public's health. This article by Malcarney et al. focuses on this question, providing a detailed overview of how the legal changes in the Affordable Care Act might be employed in a comprehensive strategy to reduce the burden of asthma.

Sara Rosenbaum, JD
George Washington University School of Public Health and Health Services
Department of Health Policy, Washington, DC

USING INSURANCE LAWS TO IMPROVE ACCESS TO COMMUNITY-BASED ASTHMA PREVENTION

Mary-Beth Malcarney, JD, MPH
Naomi Seiler, JD
Katie Horton, RN, JD, MPH

Asthma symptoms are triggered and exacerbated by many risk factors found in homes and community environments. Interventions designed to reduce or eliminate these triggers—such as patient self-management education, home visits and care coordination by asthma educators and community health workers, and supplies to mitigate environmental asthma triggers—can greatly decrease asthma morbidity. However, many of these evidence-based interventions and services fall outside of traditional clinical health-care interventions included in care delivery systems and reimbursed by insurers. This installment of *Law and the Public's Health* reviews the role Medicaid, the Children's Health Insurance Program (CHIP), and private insurers can play to promote public health through community-based asthma prevention.

BACKGROUND

Asthma is among the most common chronic diseases. According to the Centers for Disease Control and Prevention (CDC), in 2011, almost 26 million people in the United States—approximately 9.5% of children younger than 18 years of age and 8.2% of adults aged 18 years and older—had asthma.[1,2] Asthma is the single most common chronic condition among children in the U.S.,[3] and the incidence is rising significantly: in 2009, more than one in 12 people had asthma compared with just one in 14 (about 20 million) in 2001.[4] Asthma can be a fatal disease if not properly managed, claiming the lives of almost 3,500 Americans each year.[5] Researchers estimate the economic burden of asthma on the U.S. at $56 billion annually, representing $50.1 billion in costs to the health-care system (in increased emergency department [ED] visits and hospitalizations) and $5.9 billion in indirect costs from lost productivity (asthma accounts for 14.4 million lost school days and 14.2 million lost work days).[5–7] Thus, curbing the epidemic and reducing costs is a public health priority.

The complexity of the disease means that clinical care is necessary, but not sufficient. Teaching patients and their families to administer asthma medication correctly and to mitigate environmental exposure—such as cigarette smoke, certain allergens (e.g., dust mites, pests, and pets), and other environmental irritants—is a central component of effective asthma management.[8–11] Expert guidelines released in 2007 by the National Asthma Education Prevention Program (NAEPP) emphasize the importance of community patient education for self-management, along with control of environmental asthma triggers.[12] However, clinical providers typically lack the capacity to assume the extensive educational role envisioned by NAEPP guidelines. CDC reports that in 2008, fewer than half of patients with asthma reported being taught how to avoid home asthma triggers.[4]

Community-based asthma education programs work to fill this void and are considered fundamental to the success of any asthma-control program.[13,14] Such programs extend NAEPP guidelines in nontraditional settings, such as homes, schools, and community centers, and augment clinical care by working in coordination with action plans and other aspects of asthma treatment. Studies show the positive effects of asthma home visitation programs on asthma management, use of urgent care, allergen reduction, missed school days, and caregiver stress.[15–19] School settings represent an additional opportunity for effective asthma

education.[20–24] Rigorous evaluation has shown the benefits of community asthma education in controlling symptoms, improving medication adherence and quality of life, and reducing medical costs,[12,25] with savings of $5.30 to $14.00 for each dollar spent.[26] Other studies show similar results for children and adults when community interventions are combined with clinical care improvements.[25,27,28] In one study, implementation of a school-based health center intervention for children with asthma resulted in decreased health-care utilization, bringing net savings of nearly $1,000 per child per hospitalization.[29]

HOW INSURANCE DESIGN AFFECTS COMMUNITY-BASED ASTHMA INTERVENTIONS

The results of community-based asthma intervention studies have prompted some private insurers to modify coverage and payment principles to reach home- and community-based asthma education. For example, Optima Health Plan's Asthma Life Coach program deploys nurses and respiratory therapists to patients' homes to carry out education, medication review, and instruction on environmental asthma triggers.[30] Optima estimates a return on investment of $4.40 for every $1.00 spent.[31,32] Priority Health Plan's program, which includes asthma management and trigger avoidance education and mitigation of environmental risk factors, has improved medication use and significantly reduced ED visits and hospitalizations, generating net per-child savings of $800 per year.[27] Priority Health Plan estimates project total savings of more than $1.7 million. The Neighborhood Health Plan runs a similar asthma program, estimating more than a 30% reduction in hospitalizations and ED visits since the program's inception.[30]

Despite these results, innovative asthma programs are not in widespread use, and coverage of and payment for community education is not typical.[18,27] As a result, most of the community-based interventions in the field today rely on limited funding from CDC's National Asthma Control Program or from private foundations. Community benefit support from nonprofit hospitals might be an additional source of such funding, but no data exist on how frequently hospitals make investments in community-based asthma interventions.[33,34] Maintaining community programs is a challenge, and few communities are able to maintain these interventions when funding dollars run dry.[35]

USING INSURANCE LAWS TO ADVANCE COMMUNITY-BASED ASTHMA INTERVENTIONS

The fact that some insurers participating in public programs and private insurance markets do offer broader coverage and payment for community-based asthma interventions while others do not underscores that the exclusion of community-based interventions is largely the result of insurer discretion rather than legal limitations on coverage and payment. Examining how existing insurance sources might be better deployed to advance community prevention thus emerges as a public health policy priority, particularly as the expanded insurance markets created by the Affordable Care Act (ACA) begin to emerge.

Medicaid

Medicaid policy is central to this discussion because of the association among asthma prevalence, poor asthma management (as measured by higher ED use),[36–38] and poverty.[3,39] Medicaid can play a significant role in bringing effective community asthma programs to low-income and medically underserved populations.

Preventive benefits for children as part of EPSDT. Preventive benefits are optional for traditionally eligible adult populations (e.g., caretakers and parents, pregnant women, and adults with disabilities) but are required for beneficiaries younger than 21 years of age as a result of Medicaid's special Early and Periodic Screening Diagnosis and Treatment (EPSDT) entitlement, which encompasses not only screening and diagnostic services, but all treatments recognized under federal law, including preventive services.[40,41] Proposed federal regulations issued in 2013 clarify that the statutory term "preventive services" encompasses not only preventive care *furnished by* licensed professionals, but also services *recommended by* physicians and other licensed practitioners of the healing arts, even if performed by others.[42,43] Thus, if these regulations are finalized, it will be lawful for Medicaid (either directly or through its managed care contractors) to cover and pay for a community-based asthma intervention even when carried out by health educators or other community health workers. Although not considered licensed health-care professionals, these personnel may still have to meet a state's training and, where applicable, certification standards. Furthermore, federal Medicaid law already gives states discretion over the settings in which care is furnished. As a result, coverage for preventive services is permissible even when the intervention happens outside the clinical setting. Essentially, a physician can prescribe a health educator home visit, and Medicaid can cover and pay for the service as a form of "medical assistance."[42]

Community-based interventions as part of Medicaid "health homes." The ACA creates a new state Medicaid option to create "health homes" for individuals with one or more chronic conditions, specifically including asthma.[44] Since this Medicaid option became available in January 2011, seven states have established Medicaid health homes that include as eligible beneficiaries both children and adults with asthma.[45] Under the law, health homes are responsible for providing or coordinating all patient care, as well as a specific set of health home services: comprehensive care management, care coordination and health promotion, patient and family support, and referral to community and social support services.[44] Federal guidelines emphasize that health homes must contain sufficient providers to deliver a "whole-person approach to care," which includes access to health education and promotion of disease self-management, in coordination with community-based services.[46] The guidelines also emphasize state discretion over the range of participating preventive service providers and treatment settings. Oregon has used this authority to include community health workers and peer wellness specialists among its health home participating providers when they meet criteria established by the Oregon Health Authority.[47]

Contracting with managed care providers. As noted, Medicaid agencies have the legal power to cover and pay for medical assistance either directly or through participating managed care organizations (MCOs). Today, managed care enrollment accounts for more than 70% of Medicaid beneficiaries.[48] Under their contractual agreements, states can specify community-based asthma interventions; MCOs also have the authority to use their revenues to supplement what the state's fee-for-service Medicaid program may cover. Community-based asthma interventions bear a striking similarity to the disease-management strategies used by MCOs to manage chronic conditions, and some MCOs include asthma in their disease-management arsenals. For example, in 2002, Monroe Plan for Medical Care—a Medicaid MCO plan in New York State—launched a program for children with asthma, providing specialty clinical care, case-management services, educational materials, home environmental assessments, and supplies for reducing exposure to environmental triggers. For every $1.00 spent, $1.48 was saved in direct medical costs through a 60% reduction in hospitalizations and 78% fewer ED visits.[27,49] Other MCOs implementing similar community asthma interventions have yielded comparable results.[30,50]

Medicaid demonstration authority. Although states have all the flexibility they need to expand coverage and payment to incorporate community-based asthma services without special waivers, some states have incorporated asthma care into their demonstration waivers to target the communities in which such additional services will be available. For example, states may seek a waiver to the statewideness rule—a Medicaid rule that requires medical assistance coverage to be available to all state residents—to direct interventions toward specific localities and populations.[51] Demonstration authority (found in Section 1115 of the Social Security Act[52]) also may enable states to cover supplies not otherwise considered medical assistance, such as allergen-proof mattress covers or air humidifiers.

Through its special MassHealth §1115 demonstration, Massachusetts has developed a pediatric asthma pilot program to provide more flexibility for coverage of community prevention services not traditionally covered by Medicaid, including home visits, care coordination by community health workers, and supplies to mitigate environmental triggers.[53] This pilot also tests an innovative payment methodology, using a bundled per-member, per-month payment for services not traditionally covered by MassHealth. The Center for Medicare and Medicaid Innovation (CMMI), whose establishment was authorized under the ACA to test new efficient delivery and service arrangements, also has approved innovative projects in New England, Delaware, and Tennessee that support the provision of services and the inclusion of providers not traditionally covered under Medicaid.[54] For example, the Nemours/Alfred I. duPont Hospital for Children is partnering with Medicaid and public health officials as well as community-based organizations to address asthma triggers in schools and homes, use certified community health workers as patient navigators who provide case-management services to high-need families, and develop an asthma population health initiative in specific neighborhoods.

CHIP

The types of flexibilities outlined under Medicaid apply equally to CHIP. Thus, states with separately administered CHIPs might consider revisions to the scope of child health assistance, as well as modifications of purchasing agreements with CHIP issuers, to incorporate preventive, community-based asthma interventions that use health workers who meet state-established performance criteria.

Including community-based preventive asthma intervention as a qualified health plan performance standard. As the nation moves closer to full implementation of the ACA, coverage under qualified health plans (QHPs) will become available to millions of lower- and

moderate-income individuals and families through health insurance marketplaces, known under the law as Exchanges. As of January 2013, 19 states are moving toward operating state-based marketplaces, while another seven will participate in a state Partnership with a federal marketplace.[55] In both cases, states will have the authority to design the certification criteria for QHPs. One criterion is offering essential health benefits that include services for children as well as preventive, disease-management, and rehabilitative services. While federal law sets minimum standards governing these requirements, states retain the flexibility to establish performance standards for QHPs that measure their performance by how well they deliver community-based asthma intervention services to patients with diagnosed asthma as part of their disease intervention and preventive services activities. Financing community prevention through QHPs thus becomes a basic measure of plan performance.

IMPLICATIONS FOR PUBLIC HEALTH PRACTICE AND POLICY

This brief review underscores the important role that both public and private health insurance can play in financing community-based asthma interventions for patients with asthma. Insurance generally does not finance group treatments; that is, it would not be possible for an insurer to treat as a covered benefit an award of funding to a school, for example, to run a health education program. But an insurer, public or private, could pay for the services received by individual children in such settings, and third-party payments, coupled with grants from public programs or hospital community benefit investments, might be used to help sustain such an effort. In terms of home visits for individual patients, this article emphasizes that such patient-specific treatments fall well within the meaning of coverage under Medicaid and CHIP and should be an important quality improvement performance standard for QHPs, which are expected to operate effective preventive programs that return good value for the investment.

What is perhaps most needed is a public health community that gains sufficient familiarity with the flexibility made possible by modern insurance products to effectively advocate for these types of design and performance modifications as a core element of public health practice. Plenty of examples exist; the task becomes translating these examples into policy of general applicability. For policy translation to occur, public health expertise on program content and performance measurement will be key, along with active efforts to convince payers of the wisdom of such modifications.

Mary-Beth Malcarney is an Assistant Research Professor, Naomi Seiler is an Associate Research Professor, and Katie Horton is a Research Professor, all in the Department of Health Policy at the George Washington University School of Public Health and Health Services in Washington, D.C.

Address correspondence to: Mary-Beth Malcarney, JD, MPH, George Washington University School of Public Health and Health Services, Department of Health Policy, 2021 K St. NW, Ste. 800; tel. 202-994-4214; e-mail <mbharty@gwu.edu>.

©2013 Association of Schools and Programs of Public Health

REFERENCES

1. Centers for Disease Control and Prevention (US). 2011 National Health Interview Survey (NHIS) data: table 3-1: current asthma population estimates—in thousands by age, United States: National Health Interview Survey, 2011 [cited 2013 Jan 13]. Available from: URL: http://www.cdc.gov/asthma/nhis/2011/table3-1.htm
2. Centers for Disease Control and Prevention (US). 2011 National Health Interview Survey (NHIS) data: table 4-1: current asthma prevalence percents by age, United States: National Health Interview Survey, 2011 [cited 2013 Jan 13]. Available from: URL: http://www.cdc.gov/asthma/nhis/2011/table4-1.htm
3. Akinbami LJ, Moorman JE, Bailey C, Zahran HS, King M, Johnson CA, et al. Trends in asthma prevalence, health care use, and mortality in the United States, 2001–2010. NCHS Data Brief 2012;(94):108.
4. Centers for Disease Control and Prevention (US). Vital signs: asthma in the US: growing every year. May 2011 [cited 2013 Jan 6]. Available from: URL: http://www.cdc.gov/vitalsigns/asthma
5. National Center for Health Statistics (US). National Health Interview Survey raw data, 2009. Analysis by the American Lung Association Research and Program Services Division [cited 2013 Jan 4]. Available from: URL: http://www.lung.org/lung-disease/asthma/resources/facts-and-figures/asthma-in-adults.html#1
6. National Center for Health Statistics (US). National Hospital Discharge Survey, 1995–2010. Analysis by the American Lung Association Research and Health Education Division [cited 2013 Jan 4]. Available from: URL: http://www.lung.org/lung-disease/asthma/resources/facts-and-figures/asthma-children-fact-sheet.html#4
7. Barnett SB, Nurmagambetov TA. Costs of asthma in the United States: 2002–2007. J Allergy Clin Immunol 2011;127:145-52.
8. Etzel RA. How environmental exposures influence the development and exacerbation of asthma. Pediatrics 2003;112(1 Pt 2):233-9.
9. Coffman JM, Cabana MD, Halpin HA, Yelin EH. Effects of asthma education on children's use of acute care services: a meta-analysis. Pediatrics 2008;121:575-86.
10. Purmort J, Coady MH, Bucciarelli A, Bonner S. Asthma education in a subsidized preschool setting. J Health Care Poor Underserved 2008;19:1241-7.
11. Wood P, Tumiel-Berhalter L, Owen S, Taylor K, Kattan M. Implementation of an asthma intervention in the inner city. Ann Allergy Asthma Immunol 2006;97(1 Suppl 1):S20-4.
12. Department of Health and Human Services (US). Expert panel report 3: guidelines for the diagnosis and management of asthma. Bethesda (MD): National Heart, Lung, and Blood Institute (US); 2007.
13. Clark N, LaChance L, Friedman Milanovich A, Stoll S, Awad DF. Characteristics of successful asthma programs. Public Health Rep 2009;124:797-805.
14. Brown AS, Disler S, Burns L, Carlson A, Davis A, Kurian C, et al. Family and home asthma services across the Controlling Asthma in American Cities Project. J Urban Health 2011;88 Suppl 1:S100-12.
15. Krieger J, Takaro TK, Song L, Beaudet N, Edwards K. A randomized controlled trial of asthma self-management support comparing clinic-based nurses and in-home community health workers: the Seattle-King County Healthy Homes II Project. Arch Pediatr Adolesc Med 2009;163:141-9.

16. Findley SE, Thomas G, Madera-Reese R, McLeod N, Kintala S, Andres Martine R, et al. A community-based strategy for improving asthma management and outcomes for preschoolers. J Urban Health 2011;88 Suppl 1:S85-99.
17. Celano MP, Holsey CN, Kobrynski LJ. Home-based family intervention for low-income children with asthma: a randomized controlled pilot study. J Fam Psychol 2012;26:171-8.
18. Williams D, Portnoy JM, Meyerson K. Strategies for improving asthma outcomes: a case-based review of successes and pitfalls. J Manag Care Pharm 2010;16(1 Suppl C):S3-14.
19. Morgan WJ, Crain EF, Gruchalla RS, O'Connor GT, Kattan M, Evans R III, et al. Results of a home-based environmental intervention among urban children with asthma. N Engl J Med 2004;351:1068-80.
20. Bruzzese JM, Unikel L, Gallagher R, Evans D, Colland V. Feasibility and impact of a school-based intervention for families of urban adolescents with asthma: results from a randomized pilot trial. Fam Process 2008;47:95-113.
21. Clark NM, Brown R, Joseph CL, Anderson EW, Liu M, Valerio MA. Effects of a comprehensive school-based asthma program on symptoms, parent management, and absenteeism. Chest 2004;125:1674-9.
22. Clark NM, Shah S, Dodge JA, Thomas LJ, Andridge RR, Little RJ. An evaluation of asthma interventions for preteen students. J Sch Health 2010;80:80-7.
23. Evans D, Clark NM, Levison MJ, Levin B, Mellins RB. Can children teach their parents about asthma? Health Educ Behav 2001;28:500-11.
24. Shah S, Peat JK, Mazurski EJ, Wang H, Sindhusake D, Bruce C, et al. Effect of peer led programme for asthma education in adolescents: cluster randomised controlled trial. Br Med J 2001;322:583-5.
25. Howell JR, De Biasi A, Gratale D, Chang DI. Transforming population health: case studies of place-based approaches [cited 2013 Apr 28]. Available from: URL: http://www.nemours.org/content/dam/nemours/www/filebox/healthpro/advocacy/boston.pdf
26. Nurmagambetov TA, Barnette SB, Jacob V, Chattopadhyay SK, Hopkins DP, Crocker DD, et al. Economic value of home-based, multi-trigger, multicomponent interventions with an environmental focus for reducing asthma morbidity—a community guide systematic review. Am J Prev Med 2011;41(2 Suppl 1):S33-42.
27. Hoppin P, Jacobs M, Stillman L. Investing in best practices for asthma: a business case for education and environmental interventions. Dorchester (MA): Asthma Regional Council of New England; 2010.
28. Center for Health Care Strategies, Inc. ROI evidence base: studies on asthma. 2007 [cited 2013 Apr 28]. Available from: URL: http://www.chcs.org/usr_doc/Asthma_Studies.pdf
29. Guo JJ, Jang R, Keller KN, McCracken AL, Pan W, Cluxton RJ. Impact of school-based health centers on children with asthma. J Adolesc Health 2005;37:266-74.
30. Environmental Protection Agency (US). National Environmental Leadership Award in Asthma Management: health plan award winners [cited 2013 Jan 12]. Available from: URL: http://www.asthmaawards.info/awards/winners/category/126
31. Bray K, Turpin RS, Junkind K, Heuser G. Defining success in diabetes disease management: digging deeper into the data. Dis Manag 2008;11:119-28.
32. Environmental Protection Agency (US). Optima Health: 2005 winner of EPA's National Environmental Leadership Award in Asthma Management [cited 2013 Apr 28]. Available from: URL: http://www.epa.gov/asthma/pdfs/optima_health_case_history.pdf
33. Internal Revenue Service (US). Schedule H (Form 990) 2011: hospitals (revised 2012) [cited 2013 Apr 28]. Available from: URL: http://www.irs.gov/pub/irs-pdf/f990sh.pdf
34. Byrnes M, Rieke AM. Hospital tax-exempt policy: a comparison of Schedule H and state community benefit reporting systems. Frontiers in Public Health Services & Systems Research 2013;2(1):article 3. Also available from: URL: http://uknowledge.uky.edu/frontiersinphssr/vol2/iss1/3 [cited 2013 Apr 28].
35. Clark NM. Community-based approaches to controlling childhood asthma. Annu Rev Public Health 2012;33:193-208.
36. Gold LS, Smith N, Allen-Ramey FC, Nathan RA, Sullivan SD. Associations of patient outcomes with level of asthma control. Ann Allergy Asthma Immunol 2012;109:260-5.
37. Hanania NA, David-Wang A, Kesten S, Chapman KR. Factors associated with emergency department dependence of patients with asthma. Chest 1997;111:290-5.
38. Finkelstein JA, Barton MB, Donahue JG, Algatt-Bergstrom P, Markson LE, Platt R. Comparing asthma care for Medicaid and non-Medicaid children in a health maintenance organization. Arch Pediatr Adolesc Med 2000;154:563-8.
39. Kaiser Commission on Medicaid and the Uninsured. The role of Medicaid for people with respiratory disease. Washington: Kaiser Family Foundation; November 2012. Also available from: URL: http://www.kff.org/medicaid/upload/8383_RD.pdf [cited 2013 Jan 15].
40. 42 U.S.C. §1396d(a)(4)(B).
41. 42 U.S.C. §1396d(r)(5).
42. 42 U.S.C. §1396d(a)(13).
43. Centers for Medicare & Medicaid Services (US). Proposed rule: Medicaid, Children's Health Insurance Programs, and Exchanges: essential health benefits in alternative benefit plans, eligibility notices, fair hearing and appeal processes for Medicaid and Exchange eligibility appeals and other provisions related to eligibility and enrollment for Exchanges, Medicaid and CHIP, and Medicaid premiums and cost sharing. Proposed 42 C.F.R. §440.130(c).
44. Social Security Act §1945, added by the Patient Protection and Affordable Care Act, Pub. L. No. 111-148, §2703, 124 Stat. 855 (March 2010).
45. Integrated Care Resource Center. State-by-state health home state plan amendment matrix: summary overview. Baltimore: Integrated Care Resource Center; 2012.
46. Department of Health and Human Services (US). Health homes for enrollees with chronic conditions: SMDL# 10-024. Washington: Centers for Medicaid & Medicare Services, Center for Medicaid, CHIP and Survey & Certification (US); 2010. Also available from: URL: http://downloads.cms.gov/cmsgov/archived-downloads/SMDL/downloads/SMD10024.pdf [cited 2013 Apr 21].
47. Letter from Carol J.C. Peverly, Associate Regional Administrator, Division of Medicaid and Children's Health Operations, to Bruce Goldberg, MD, Director, Oregon Health Authority. Re: Oregon state plan amendment (SPA) transmittal number 11-011 [cited 2013 Apr 21]. Available from: URL: http://www.chcs.org/usr_doc/OR11-011_Approval_Package_%283_13_12%29.pdf
48. Medicaid and CHIP Payment and Access Commission. Report to the Congress: the evolution of managed care in Medicaid. Washington: MACPAC; June 2011.
49. Environmental Protection Agency (US). Communities in Action for Asthma Friendly Environments: exemplary award winner profiles [cited 2013 Jan 13]. Available from: URL: http://www.asthmacommunitynetwork.org/node/708
50. Bielaszka-DuVernay C. Taking public health approaches to care in Massachusetts. Health Aff (Millwood) 2011;30:435-8.
51. 42 U.S.C. §1396a(a)(2).
52. Social Security Act §1115; 42 U.S.C. §1315.
53. Letter from Marilyn Tavenner, Acting Administrator of the Centers for Medicare & Medicaid Services, to JudyAnn Bigby, Secretary of the Massachusetts Executive Office of Health and Human Services. 2011 Dec 20 [cited 2013 Jan 14]. Available from: URL: http://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Waivers/1115/downloads/ma/ma-masshealth-ca.pdf
54. Centers for Medicare & Medicaid Services, Center for Medicare and Medicaid Innovation (US). Health Care Innovation Award project profiles. July 30, 2012 [cited 2013 Jan 14]. Available from: URL: http://innovations.cms.gov/Files/x/HCIA-Project-Profiles.pdf
55. National Conference of State Legislatures. State actions to address health insurance Exchanges [cited 2013 Jan 28]. Available from: URL: http://www.ncsl.org/issues-research/health/state-actions-to-implement-the-health-benefit-exch.aspx

NCHS Dataline

New services are available to users of the Press Room website of the National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention (CDC). The site's newest feature, Stat Line, is an index to the key health indicators covered in the National Health Interview Survey (NHIS) Early Release Reports. The latest report, with data through July 2012, has just been released. NCHS recently launched a quarterly e-newsletter describing current activities and highlighting future plans and programs. The final review on Healthy People 2010 (HP 2010) has now been published. It presents a quantitative assessment of the progress in reaching the goals and objectives of the Healthy People initiative during the past decade.

NCHS PRESS ROOM OFFERS NEW SERVICES TO DATA USERS

The NCHS Press Room is now sharing the latest NCHS data releases with subscribers via e-mail and Twitter (@NCHStats). Subscribers receive highlights of new releases, along with links to full reports. In addition, the NCHS Press Room homepage (http://www.cdc.gov/nchs/pressroom) provides a projected schedule of data files and publications to be released or published in the next year, viewable by subject matter or planned month of release. Other features include topical indexes to NCHS statistics, as well as archives of NCHS publications, QuickStats, and the NCHS data charts that appear in each issue of the *Morbidity and Mortality Weekly Report*.

EARLY RELEASE OF ESTIMATES FROM THE NHIS

The NHIS is an annual, large-scale household interview survey of a sample of the nation's civilian, noninstitutionalized population. Launched in 1997, the NHIS Early Release Program was designed to provide current and trend data on selected health indicators so that users could track changes on key health topics. Each quarterly report provides estimates on 15 selected health measures. The latest report, "Early Release of Selected Estimates Based on Data from the January–June 2012 National Health Interview Survey,"[1] covers the following indicators: lack of health insurance coverage and type of coverage, usual place to go for medical care, obtaining needed medical care, receipt of influenza vaccination, receipt of pneumococcal vaccination, obesity, leisure-time physical activity, current smoking, alcohol consumption, human immunodeficiency virus (HIV) testing, general health status, personal care needs, serious psychological distress, diagnosed diabetes, and asthma episodes and current asthma.

Notable findings from the latest issue show the following trends:

- For January–June 2012, the percentage of the population uninsured at the time of interview was 14.6%, which was a slight drop from the 2011 estimate of 15.1%.
- The percentage of people who had a usual place to go for medical care for January–June 2012 was 85.5%, which was slightly lower than the 2011 estimate of 86.8%.
- For January–June 2012, 6.1% of the population failed to obtain needed medical care due to cost at some time during the past 12 months, which was not significantly different from the 2011 estimate of 6.5%.
- For January–June 2012, 28.7% of U.S. adults aged ≥20 years were obese. This percentage remained unchanged from 2011 but was up from 19.4% in 1997.
- For January–June 2012, the percentage of adults aged ≥18 years who were current smokers was 18.0%, which was slightly lower than the 2011 estimate of 18.9% and significantly lower than the rate of current smokers (24.7%) in 2007.
- For January–June 2012, the percentage of adults who had five or more drinks in one day at least once in the past year remained unchanged from 2011 at 22.1%. The percentage decreased from 21.4% in 1997 to 19.1% in 2004 and then increased to 22.8% in 2009.
- For January–June 2012, the percentage of people who had excellent or very good health was 65.6%, the same as in 2011 but down somewhat from 68.5% in 1997.
- The prevalence of diagnosed diabetes among adults aged ≥18 years increased from 5.1% in 1997 to 9.2% in January–June 2012.

In addition to tracking trends, the Early Release Program presents estimates by age, gender, race/ethnicity, and income levels. Key findings from the latest report include:

- In January–July 2012, for both genders combined, the percentage of people who had received an influenza vaccination during the past 12 months was highest among people aged ≥65 years (69.0%), followed by people aged 6 months–17 years (46.4%), 50–64 years (42.8%), and 18–49 years (26.7%). Among people aged ≥6 months, and for adults aged 18–49 years and 50–64 years, females were more likely than males to have received an influenza vaccination during the past 12 months.
- The percentage of adults aged ≥65 years who had ever received a pneumococcal vaccination was 44.5% for Hispanic people, 64.5% for non-Hispanic white people, and 45.8% for non-Hispanic black people.
- The age-sex-adjusted percentage of adults who met the 2008 federal Physical Activity Guidelines[2] for aerobic activity (based on leisure-time activity) was 43.5% for Hispanic adults, 53.5% for non-Hispanic white adults, and 40.5% for non-Hispanic black adults.
- The age-sex-adjusted percentages of people who ever had an HIV test were 36.6% for Hispanic people, 32.0% for non-Hispanic white people, and 53.3% for non-Hispanic black people.
- For both genders combined, adults aged ≥85 years (16.9%) were more than five times as likely as adults aged 65–74 years (3.3%) to need help with personal care from other people.
- The percentage of people who had experienced serious psychological distress during the past 30 days was 2.6% for adults aged 18–44 years, 4.2% for adults aged 45–64 years, and 1.8% for adults aged ≥65 years. For all age groups, women were more likely than men to experience psychological distress.
- The sex-adjusted percentage of children <15 years of age who had an asthma episode in the past 12 months was 5.0% for Hispanic children, 4.7% for non-Hispanic white children, and 11.1% for non-Hispanic black children.

INSIDE NCHS

Inside NCHS is the new quarterly e-newsletter from NCHS. The newsletter regularly reports on developments in the NCHS data systems, including availability of new reports and releases; information on new initiatives in data collection, analysis, and dissemination; and special services developed for data users. Events such as the NCHS-sponsored National Conference on Health Statistics and other workshops and seminars are also announced through the newsletter. *Inside NCHS* can be accessed online at http://www.cdc.gov/nchs/newsletter.

HP 2010 FINAL REVIEW

The "Healthy People 2010 Final Review"[3] continues the series of profiles of the nation's health objectives as an integral part of the U.S. Department of Health and Human Services' disease and health promotion initiative. For several decades, the Healthy People program has used a collaborative process to set goals in health promotion and disease prevention to guide public health programs at the federal, state, and local levels. NCHS manages the data for the Healthy People program. Throughout the past decade, periodic progress reviews have charted progress toward and away from the goals. The final review is the last assessment in that series. Healthy People 2020 goals and objectives are now in place and the focus of the current review process.

The final review presents a summary of progress toward achieving the HP 2010 primary goals of increasing quality and years of healthy life and eliminating health disparities. The publication provides the final tracking data used to present a quantitative assessment of progress for the 969 objectives of HP 2010's 28 Focus Areas. Progress was measured for objectives using the final tracking data available—that is, baseline data and at least one additional data point. Based on an evaluation of each objective and comments received from the public as part of the Midcourse Review, 66 objectives were deleted because data were unavailable or because of a change in the science. Tracking data were unavailable to assess progress for 170 objectives (17.5% of the total). Ultimately, progress was assessed for 733 objectives with the following results: 23% of the objectives met or exceeded the HP 2010 targets, 48% of the objectives moved toward the HP 2010 targets, 5% of the objectives demonstrated no change from the baseline, and 24% of the objectives moved away from the HP 2010 targets.

For the first overarching objective—increasing quality and years of healthy life—progress toward achieving the goal is currently assessed by measuring life expectancy and three measures of healthy life expectancy: (*1*) expected years in good or better health, (*2*) expected years free of activity limitations, and (*3*) expected years free of selected chronic diseases. These assessments resulted in the following conclusions:

- Life expectancy improved for the populations that could be assessed throughout the decade.

- Women had a longer life expectancy than men, and the white population had a longer life expectancy than the black population.
- Expected years in good or better health (at birth) and expected years free of activity limitations (at birth) increased, and expected years free of selected chronic conditions (at birth) decreased.
- Differences by race/ethnicity and gender were observed in all three healthy life expectancy measures (at birth)—that is, expected years in good or better health, expected years free of activity limitations, and expected years free of selected chronic diseases. For example, women can expect to spend a slightly greater proportion of their lives in fair or poor health, with activity limitations, and with selected chronic conditions than men. And compared with the white population, the black population could expect to spend a greater proportion of life in an unhealthy state.

The second overarching goal of HP 2010 was to eliminate health disparities that occur by race/ethnicity, gender, education, income, geographic location, disability status, or sexual orientation. Findings for specific objectives and populations are presented in 27 of the 28 Focus Areas. In total, there were 469 population-based objectives for which health disparities could be measured. The report shows that substantial health disparities for many HP 2010 objectives remain, and that both increases and decreases in health disparities were observed for specific objectives. Among 169 objectives with data for racial/ethnic groups, health disparities, on average, decreased for 27 objectives and increased for 25 objectives. Among 216 objectives with data for males and females, health disparities decreased for 26 objectives and increased for 23 objectives. Females more often had better group rates than males. Among 132 objectives with data for education groups, health disparities, on average, decreased for seven objectives and increased for 20 objectives. Health disparities among income groups, as well as by geographic location and disability status, did not change, with the exception of a few objectives.

NCHS Dataline was prepared by Sandra S. Smith, MPH, Communications Consultant at the National Center for Health Statistics, Centers for Disease Control and Prevention.

REFERENCES

1. National Center for Health Statistics. Early release of selected estimates based on data from the January–June 2012 National Health Interview Survey. Hyattsville (MD): NCHS; 2012. Also available from: URL: http://www.cdc.gov/nchs/nhis/released201212.htm [cited 2013 May 19].
2. Department of Health and Human Services (US). Physical activity guidelines for Americans. Washington: HHS; 2008.
3. National Center for Health Statistics (US). Healthy people 2010 final review. Hyattsville (MD): NCHS; 2012. Also available from: URL: http://www.cdc.gov/nchs/healthy_people/hp2010/hp2010_final_review.htm [cited 2013 May 19].

On Linkages

25 YEARS OF PROMOTING DIVERSITY IN PUBLIC HEALTH LEADERSHIP: THE UNIVERSITY OF MICHIGAN'S SUMMER ENRICHMENT PROGRAM IN HEALTH MANAGEMENT AND POLICY

Richard Lichtenstein, MPH, PhD

> *"The University of Michigan Summer Enrichment Program in Health Management and Policy [UMSEP] had a profound impact on my professional trajectory. Coming from a small state school to the University of Michigan in the summer of 1996 and experiencing the program with other minority students from around the country provided me with a supportive network of driven and focused peers, exposure to a major university setting, the opportunity to directly work on a health disparities project, and a better understanding of systemic factors that contribute to disparate outcomes in care. SEP also offered honest and straightforward guidance on what it takes to be a competitive applicant to graduate school. I completed UMSEP 14 years ago, and to this day, I credit it for solidifying my passion for public health and, most importantly, the opportunity to be an alumna of one of the premier programs in public health."*
>
> —UMSEP graduate

Even while populations of color continue to grow as a proportion of the U.S. population and will likely constitute a majority by 2050,[1] the scourge of health inequalities experienced by nonwhite and Hispanic populations continues unabated.[2] There is broad agreement within the public health community that increasing the percentage of people of color in the health professions and in leadership positions in the health field would be an important step in rectifying those inequalities.[3–5] One initiative that has been successful at increasing diversity in the health-care field and encouraging students' interests in health inequalities is the University of Michigan Summer Enrichment Program in Health Management and Policy (UMSEP). This program, which celebrated its 25th year of operation in 2011, is now able to report the positive results of a survey that assessed the program's impact on its participants. We believe that other schools of public health can potentially replicate the model described in this article to promote diversity in the field.

BACKGROUND

Several national reports have called for increasing the diversity of the health workforce as a way to decrease health inequalities and improve population health. One report states that such a change "will improve the overall health of the nation … not only for members of racial and ethnic minority groups, but also for an entire population that will benefit from a health workforce that is culturally sensitive and focused on patient care."[4] Another report asserts that increasing the representation of people of color in the clinical health professions would likely lead to "improved access to care for racial and ethnic minority patients, greater patient choice and satisfaction, and better educational experiences for health professions students, among many other benefits."[5] A third report states that as the U.S. health system implements strategic changes, diverse executive leadership "is essential for implementing effective health-care reform that meets the needs of a diverse minority population and ensures/works for the elimination of health disparities/inequities."[6] Experts also argue that increasing the diversity of health-care organization leadership is good for business because it will lead to higher patient and staff satisfaction; greater perspective on, and sensitivity to, the needs of populations of color; enhanced access to care; and better decision-making by more diverse senior management teams in health organizations.[7,8]

UMSEP

The UMSEP is designed to increase the diversity of the workforce in one of the core public health disciplines: health management and policy. Although it is

Articles for *From Schools and Programs of Public Health* highlight practice- and academic-based activities at the schools. To submit an article, faculty should send a short abstract (50–100 words) via e-mail to Allison Foster, ASPPH Deputy Executive Director, at afoster@aspph.org.

not the first such program, the UMSEP is believed to be the oldest of several similar programs designed to attract undergraduate students of color to graduate training programs in public health. When it began in 1986, this graduate school-based program focused specifically on students from population groups that were underrepresented in public health at the time: African American, Hispanic, and Native American students. The program sought to introduce students to the public health field and motivate them to enroll in graduate school. Eligible students were primarily rising juniors or seniors in college (i.e., students who had just completed their sophomore or junior year) in any undergraduate discipline.

The core aspects of the UMSEP have remained largely unchanged since the program launched in 1986. (A more detailed history can be found elsewhere.[9]) Each summer, 18–25 students are placed in eight-week paid internships at hospitals and public health programs in the Detroit-Flint-Ann Arbor, Michigan, area. Each student is assigned a project and supervised by a preceptor who has leadership responsibilities in the organization. Preceptors are asked to give the students a project commensurate with their age and education level, taking into consideration that the students are younger than the typical graduate student intern. Projects completed by recent UMSEP students have included helping a community health center apply for federally qualified status, developing a needs assessment of African American patients of a hospital-based cancer program, and designing a nutrition program that sold fresh fruit and vegetables in a low-income Latino community.

On Fridays, all UMSEP participants attend a series of site visits to a wide range of health-care and public health organizations. Students come from all parts of the country and receive airfare, housing, rental vans for carpooling to sites in Flint and Detroit, and a stipend (currently $3,000). The program also provides, at no charge to the students, a graduate record examination (also known as GRE) preparation course to bolster participants' graduate school applications. Although local and national foundations provided early financial support, the program is currently funded by fees paid by internship sites (currently $6,000 per student), with additional support from university sources and individual donors. The UMSEP also has been able to provide interns to more financially limited health-care organizations at reduced or no cost by using funds donated by individuals and, to some degree, through cross-subsidizing these placements with the fees paid by better-funded organizations.

The UMSEP altered its goals and recruiting strategies in 2007 after Michigan voters approved Proposal 2 the previous fall. This proposal was an amendment to the state constitution[10] that, as interpreted by the university's attorneys, banned all race-based or Affirmative Action programs on campus. After Proposal 2, program eligibility was opened to all students committed to eliminating disparities in health and/or health care. These changes led to a broader racial composition of students who have participated since 2007; however, the program continues to attract a very high percentage of students of color to the applicant pool.

To celebrate its 25th anniversary in March 2011, the UMSEP hosted a symposium, "Diversity and Inclusion: Transforming Health Organizations to Improve Community Health." As part of the preparation for that symposium, a survey of all program alumni traced their educational and career paths since completing the UMSEP. The results of this 2010–2011 survey were presented at the symposium and are summarized in this article.[11]

METHODS

The goal of the 25th Anniversary Alumni Survey was to obtain information from all 473 UMSEP alumni. An instrument composed of 31 questions was designed to elicit basic demographic data and obtain information about how UMSEP alumni's academic and professional careers have progressed since completing the program. The survey was conducted online using Qualtrics® electronic survey software.[12]

Although the program had tried to maintain close contact with alumni throughout its history, contact information for recent graduates was far more available and current than it was for early graduates. Therefore, considerable effort was spent obtaining e-mail addresses for alumni who were not listed in the UMSEP database by accessing social networking sites and using Internet search engines. In the end, we were able to obtain valid e-mail addresses for 317 of the 473 program alumni, and this group became our survey population.

The UMSEP director sent the survey instrument to alumni via e-mail. Reminder messages were sent to nonrespondents two, four, and six weeks after initial contact. When it was certain that the addresses for graduates who were nonrespondents were correct, individualized e-mails were sent to encourage a response.

RESULTS

Completed questionnaires were received from 281 of the 317 alumni in the survey population for a response rate of 88.6%. However, as e-mail addresses could not

be obtained for 156 alumni (mostly early participants), respondents represented 59.4% of the total population of UMSEP alumni.

UMSEP alumni represent a diverse group of students (Table 1). Of the 279 respondents who answered demographic questions, almost three-quarters (73.5%) self-identified as African American and 12.5% self-identified as Hispanic. Nearly three-quarters of respondents (n=197) were female (data not shown). Because the passage of Proposal 2 in fall 2006 led to a more inclusive admissions policy in the UMSEP, we examined the racial/ethnic mix of UMSEP participants before and after 2007. The percentage of African American participants decreased from 80.4% to 54.7%, and the percentage of Hispanic participants decreased from 13.2% to 10.7% before and after 2007, respectively. Meanwhile, the percentage of Caucasian students increased from 1.0% to 14.7%, and the percentage of Asian American/Pacific Islander students increased from 3.9% to 17.3% between the two time periods (Table 1). Thus, while complying with Proposal 2 did decrease the percentage of underrepresented minority group members in the program, such participants still represented about two-thirds of participants after 2007.

The 281 respondents had attended 95 different undergraduate institutions from across the country. The largest number of participants (n=102, 36.3%) had attended the University of Michigan, Ann Arbor. The UMSEP also attracted 38 students (13.5%) from 15 different historically black colleges and universities. The remaining 141 students (50.2%) represented 79 diverse colleges and universities from around the country (data not shown).

UMSEP graduates overwhelmingly went on to apply to graduate school. Of the 253 responding alumni who had completed their undergraduate education at the time of the survey (excluding 28 respondents still enrolled as undergraduates), 233 (92.1%) said that they had already applied to a graduate program. Of the 19 alumni who had not applied to a graduate program at the time of the survey, another 14 (5.5%) said they planned to apply in the future. The UMSEP, therefore, had a 97.6% (n=247) success rate in encouraging its participants to consider post-baccalaureate education (data not shown). At the time of the survey, 175 alumni (69.2%) had received one or more graduate degrees, and another 53 (20.9%) were admitted to or enrolled in graduate programs. Nearly 70% of those receiving degrees (n=122) attended graduate programs in public health, with the majority (54.9%) enrolling in programs in health management and policy (Table 2). About one-quarter of alumni earned degrees in the clinical professions, including medicine (n=47), and one in four attended another type of graduate program, such as law, business, or public policy (n=44). As such, the UMSEP has been successful at attracting students to public health and other related programs.

Respondents who had had time to complete graduate school training (n=153, measured as those who had finished the UMSEP more than six years before the survey date, and, thus, were approximately five or more years beyond college graduation) were asked about their work histories. Of these alumni, more than three-quarters (n=120) had worked full-time in the health field after participating in the UMSEP. More specifically, two-thirds (n=101) had held a position in health management or policy, and one-quarter (n=37) had been involved in the health field as a clinical provider (some held both administrative and clinical positions) (data not shown).

Many UMSEP alumni have gone on to graduate school and careers in public health, but one goal of

Table 1. Racial/ethnic identity of UMSEP participants: University of Michigan, Ann Arbor, Michigan, 1986–2011[a]

Racial/ethnic identity	*All years* N *(percent)*	*1986–2006* N *(percent)*	*2007–2011* N *(percent)*[b]
Black/African American	205 (73.5)	164 (80.4)	41 (54.7)
Hispanic/Latino	35 (12.5)	27 (13.2)	8 (10.7)
Asian American/Pacific Islander	21 (7.5)	8 (3.9)	13 (17.3)
Caucasian	13 (4.7)	2 (1.0)	11 (14.7)
American Indian	3 (1.1)	3 (1.5)	0 (0.0)
Other (e.g., Arab American)	2 (0.7)	0 (0.0)	2 (2.7)
Total	279 (100.0)	204 (100.0)	75 (100.0)

[a]In fall 2006, Michigan voters approved "Proposal 2," which banned Affirmative Action programs on campus and opened the UMSEP to all students interested in eliminating disparities in health and/or health care. This table breaks down the racial/ethnic identities of students before (1986–2006) and after (2007–2011) the passage of Proposal 2.

[b]Percentages do not total 100 due to rounding.

UMSEP = University of Michigan Summer Enrichment Program in Health Management and Policy

Table 2. Postgraduate training of UMSEP participants (*n*=175) and public health schools attended: University of Michigan, Ann Arbor, 1986–2010

Graduate/professional programs attended[a]	N *(percent)*
Health management and policy	96 (54.9)
University of Michigan, Ann Arbor	66
University of Washington	4
Columbia University	4
University of North Carolina	3
13 other institutions	15
Institution omitted	4
Other public health disciplines	26 (14.9)
University of Michigan, Ann Arbor	7
University of North Carolina	5
University of California, Los Angeles	3
9 other institutions	10
Institution omitted	1
Medical school	22 (12.6)
Other health professions	25 (14.3)
Other (e.g., law, business, public policy, education, urban planning)	44 (25.1)

[a]Some students received multiple graduate degrees.

UMSEP = University of Michigan Summer Enrichment Program in Health Management and Policy

the survey was to measure the impact that the UMSEP had on students' intended career paths. Respondents were asked to estimate the likelihood that they would have attended a graduate program in public health prior to and after participating in the UMSEP on a 100-point scale (where 0 = no chance of attending and 100 = will definitely attend). Because the survey occurred well after the students were in the UMSEP (sometimes 20–25 years later), these answers are likely imprecise, but they still indicate the respondents' perception of the change in career intentions effected by the program. Figure 1a presents the mean of answers provided by all 281 survey respondents. The reported likelihood of UMSEP students attending a public health graduate program was 57% before participating in the program and 85% after participating in the program, indicating that UMSEP alumni perceived the program to have had a large and statistically significant ($p<0.001$) impact on their subsequent career paths.

Because careers in public health and health administration have become much more familiar to undergraduate students during the program's 25 years, it was of interest to see how these perceived likelihood estimates have changed over time. Figure 1b presents the same data split into five-year periods. As expected, participants in the earlier years reported that they were far less likely than those in later years to identify public health as a career choice before they participated in the UMSEP. The before estimates were around 40% in the first 15 years of UMSEP and grew to 70% in the most recent 10 years of UMSEP. Even with this later increase in familiarity with public health, the respondents in all five time periods indicated that they viewed the likelihood of attending a graduate program in public health as significantly higher ($p<0.001$) after program participation than before program participation, with the post-UMSEP perceived likelihood of attending graduate school reaching 89% in the most recent period.

DISCUSSION

Diversity and inclusion in the leadership of public health and health-care organizations are two important elements in the strategy for eliminating health disparities.[6] Based on the results of the UMSEP 25th Anniversary Survey, it is apparent that an undergraduate summer internship program with the goal of promoting careers in public health can contribute to the diversity of the public health workforce and have a dramatic impact on the career paths of program participants.

Survey respondents were asked to comment on how the UMSEP affected their careers, and their words support this conclusion. One participant said:

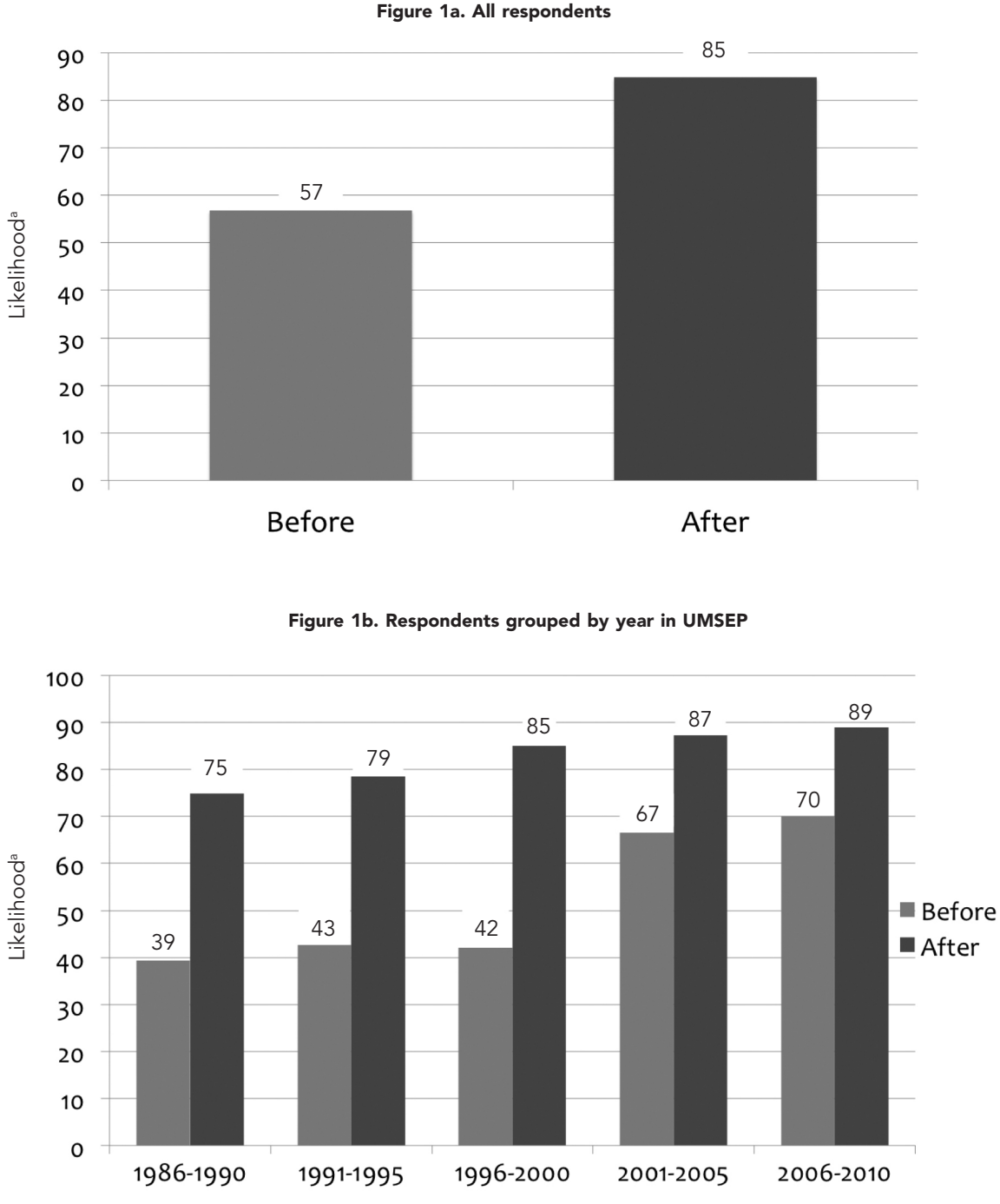
> "SEP was unquestionably one of the most transformative experiences in my life... I never thought about health-care administration because I wasn't sure it was the field for me, but now I am about to enter graduate school to attain a master's degree, and I am fully confident that I can become a leader in the field. Seeing other African American health-care administrators at site visits was a big selling point for me."

More than simply redirecting students' interests, the UMSEP prepares its alumni to play leading roles in the health system. Another alumnus stated:

> "Without this program, it is probable that I would have pursued a graduate degree in public health, but I know that it is highly unlikely that I would be the emerging leader that I strive to be without having my UMSEP summer internship."

Twenty-five years after the program was launched, graduates—especially the earlier graduates—have now begun to assume leadership positions in public health organizations and in the health-care system. Thus far, at least three former UMSEP students have become hospital CEOs, and others have assumed senior-level positions in hospital administration. Several UMSEP graduates have risen to key policy positions in the U.S. Department of Health and Human Services, and

Figure. Perceived likelihood[a] of students attending a graduate program in public health (specifically, health management and policy) before and after participating in UMSEP (n=281, p<0.001): University of Michigan, Ann Arbor, Michigan, 1986–2010



[a]On a scale from 0 to 100, where 0 = no chance of attending and 100 = will definitely attend

UMSEP = University of Michigan Summer Enrichment Program in Health Management and Policy

some worked for the Congressional committees that played a role in designing and implementing the Patient Protection and Affordable Care Act. Other UMSEP graduates have achieved success in local and state health departments, in Federally Qualified Health Centers, and in major insurance companies. Finally, several former UMSEP students who have become clinical care providers still embrace the goal of eliminating health inequalities in their practices and organizations. In presentations made during the UMSEP 25th Anniversary Symposium, some of the more senior alumni discussed how they personally have contributed to a more inclusive, multicultural environment in their organizations. They also provided examples of how decisions they made motivated their organizations to provide better service to populations of color and diversify their workforce.[11]

Limitations

There were several limitations to this survey that might have affected the results. As noted previously, 156 alumni, or 33% of total participants in the UMSEP, could not be located. A review of other program records indicates that alumni who could not be located had similar racial/ethnic and gender profiles to our survey population. It is assumed that these survey nonparticipants were less likely to have gone on to graduate school and were more likely to have entered fields other than public health or the clinical professions after graduating from college; therefore, they were less likely to remain in contact with the program. Thus, the proportion of UMSEP alumni attending graduate school or entering the public health workforce may be overstated.

CONCLUSIONS

Programs such as the UMSEP can be established in other schools of public health, and some similar programs already exist. The keys to developing an effective program are (*1*) the existence of a program champion who is willing and able to spend the time to lead the program to success; (*2*) the support of deans, department chairs, and university officials who are willing to help launch such a program with both seed money and ongoing funding; and (*3*) strong relationships with local public health and health-care organizations that are committed to the goals of diversity and inclusion, and are willing to train and provide financial support to excellent undergraduate students interested in addressing racial/ethnic health inequalities in the U.S.

A key lesson learned in the operation of the UMSEP is that there are many intelligent, committed, and talented students of color in undergraduate colleges and universities who would excel in public health but who have not been exposed to the field. The UMSEP's success has belied two prevalent misperceptions about the recruitment and retention of students of color in schools of public health. One misperception is that there are not enough academically qualified students of color available. The UMSEP has received an average of approximately 350 applications per year during the past decade, and most of these applications have come from highly qualified students in underrepresented minority groups. The UMSEP can only accept 25 students per year, so other similar programs are sorely needed to accommodate all of these promising and committed students.

The second fallacy disproved by the UMSEP is that students of color who have the academic credentials to be successful in public health will inevitably choose medicine, law, or business careers before choosing a career in public health. On the contrary, a large number of the best and brightest undergraduate students of color are extremely interested in public health. The majority of UMSEP alumni have gone on to graduate studies and careers in the field, and they value the chance to have a successful career while giving back to the community and contributing to the elimination of health inequalities. With the full implementation of the Affordable Care Act in 2014, the availability of well-trained, committed people of color to lead both health delivery institutions and public health organizations will be even more important if the nation is to address the unacceptable health inequalities that continue to confront major portions of our population.

The author thanks Sha' Duncan Smith for developing the electronic version of the questionnaire on Qualtrics®; Olushola Samuel for locating missing University of Michigan Summer Enrichment Program in Health Management and Policy (UMSEP) alumni and managing the online survey process; Lauren Daaku for helping to keep the alumni list current; Charlita Daniels for assistance with the survey process; his daughter, Erin, for technical assistance; the UMSEP alumni who completed the questionnaire; and the many generous financial supporters of this program, including the Dean's Office of the University of Michigan (UM) School of Public Health, the UM Office of the Provost, the UM Health System, and several private foundations and individual contributors.

The study was determined to be exempt from Institutional Review Board (IRB) approval by the University of Michigan Health Sciences and Behavioral Sciences IRB.

Richard Lichtenstein is the S.J. Axelrod Collegiate Professor of Health Management and Policy at the UM School of Public Health and Director of the UMSEP in Ann Arbor, Michigan.

Address correspondence to: Richard Lichtenstein, MPH, PhD, University of Michigan School of Public Health, 1415 Washington Heights, M3124 SPH II, Ann Arbor, MI 48109-202; tel. 734-936-1316; fax 734-764-4338; e-mail <lichto@umich.edu>.

©2013 Association of Schools and Programs of Public Health

REFERENCES

1. Census Bureau (US). An older and more diverse nation by mid-century [news release] 2008 Aug 14 [cited 2012 Feb 17]. Available from: URL: http://www.census.gov/newsroom/releases/archives/population/cb08-123.html
2. Williams DR, Mohammed SA, Leavell J, Collins C. Race, socioeconomic status, and health: complexities, ongoing challenges, and research opportunities. Ann N Y Acad Sci 2010;1186:69-101.
3. Cohen JJ, Gabriel BA, Terrell C. The case for diversity in the health care workforce. Health Aff (Millwood) 2002;21:90-102.
4. Sullivan Commission on Diversity in the Healthcare Workforce. Missing persons: minorities in the health professions. Washington: Sullivan Commission; 2004.
5. Smedley BD, Butler AS, Bristow LR, editors. In the nation's compelling interest: ensuring diversity in the health-care workforce. Washington: National Academies Press; 2004.
6. Advisory Committee on Minority Health. Ensuring that health care reform will meet the health care needs of minority communities and eliminate health disparities: a statement of principles and recommendations. Washington: Department of Health and Human Services (US), Office of Minority Health; 2009.
7. Smedley BD, Stith AY, Colburn L, Evans CH. The right thing to do, the smart thing to do: enhancing diversity in the health professions. Washington: National Academy Press; 2001.
8. Warden G. Leadership diversity. J Healthc Manag 1999;44:421-2.
9. Lichtenstein R. Promoting diversity in health management: the University of Michigan experience. J Health Adm Educ 2005;22:251-82.
10. Coalition to Defend Affirmative Action v. Regents of the University of Michigan, 652 F.3d 607 (6th Cir. 2011).
11. University of Michigan. Diversity and inclusion: transforming health organizations to improve community health. Symposium for the 25th anniversary of the University of Michigan Summer Enrichment Program in Health Management and Policy; 2011 Mar 31–Apr 1; Ann Arbor, Michigan.
12. Qualtrics Labs, Inc. Qualtrics® Research Suite: Version 12,018. Provo (UT): Qualtrics Labs, Inc.; 2011.

On Academics

THE VALUE OF LIBERAL ARTS AND PRACTICE IN AN UNDERGRADUATE PUBLIC HEALTH CURRICULUM

Michael Rozier, MHS
Darcell Scharff, PhD

Many public health educators have noted the rapid growth and proposed sustainability of undergraduate programs in public health.[1,2] Several educators have also articulated the reasons for developing such programs,[3,4] most notably in the 2003 Institute of Medicine Report, "Who Will Keep the Public Healthy?,"[5] and the kinds of students who are attracted to them.[6] Administrators of graduate programs in public health can safely assume that their students are primarily interested in either practice or research in the health sciences. Therefore, it is reasonable that the curricular and co-curricular expectations are designed to produce competent public health practitioners with an adequate understanding of research. Such an assumption cannot be made, however, about students who enroll in undergraduate public health programs.

Undergraduate public health programs across the country are attracting students who will enter the public health workforce or continue to graduate school in the health sciences. Undergraduate training in public health can help to address the looming public health workforce shortage by preparing students for entry-level positions.[6,7] In addition, many students study public health because it is an interesting field that provides a foundation for a future outside of the health sciences. The critical thinking of social sciences, the mechanistic knowledge of hard sciences, and the real-world application of allied health professions can all be found in an undergraduate public health curriculum.[4]

The proliferation of undergraduate public health programs is changing public health education. The consistency that the public health community has come to expect from Master of Public Health (MPH) programs, especially with the advent of competency-based curricula, will likely not be possible with the flourishing of undergraduate programs. Allowing for diversity at the undergraduate level, even a diversity that inevitably complicates our efforts, is the best way to serve our students and the field of public health.

PHILOSOPHIES OF UNDERGRADUATE PUBLIC HEALTH PROGRAMS

There are several strategies for incorporating public health into general undergraduate studies: individual courses, minors, and academic majors.[6,8,9] In this article, we are concerned with academic majors—whether connected to schools of public health or not. Based on our analysis, two major philosophies are emerging related to the academic majors: programs within a liberal arts framework and programs within a practice-based framework.[10,11]

Liberal arts framework

An undergraduate public health degree can emerge quite naturally out of the liberal arts tradition. A liberal arts degree is not designed to graduate students competent in any particular skill set but to produce educated citizens who are able to apply skills of critical

and creative thinking and communication in any number of situations.[11] A liberal arts degree in public health adds the value of experiential learning, intercultural competence, ethical reasoning and action, and interdependent teamwork.[4,11] Liberals arts degrees can lead a student directly to employment in a wide variety of fields or can serve as a pre-professional degree. Such degrees require a broad-based core curriculum, and the multidisciplinary nature of public health lends itself well to this kind of study.

A purely liberal arts framework, however, has its challenges. Nearly all stakeholders in higher education are increasingly concerned with the linkage between obtaining a degree and gaining meaningful employment. This linkage is harder to make with liberal arts degrees than it is with business, clinical, or technical degrees. Moreover, the training of public health faculty and the lens through which education has traditionally been viewed have been practice oriented. Therefore, if the undergraduate degree is emerging out of an established graduate-level program, public health faculty may be uncomfortable with the significant differences associated with a liberal arts education. On the other hand, if the undergraduate degree is emerging out of a liberal arts faculty who are trained to teach in this manner, the challenge becomes whether they have the depth of public health knowledge necessary to deliver the content of a public health degree.

Practice-based framework

The practice-based framework for undergraduate public health education is also understandable. With a tradition of practice-based education at the graduate level, competency-based curricula, and faculty trained to teach from a practice-based perspective, it is reasonable to want to replicate success and capitalize on expertise for expansion at the undergraduate level. Public health is an inherently action-oriented discipline, which is a major part of the attraction for students at all levels. In addition, the public health workforce will be in need of replenishment in the years to come,[12,13] and producing well-trained undergraduates can be a cost-effective way for supply to meet demand,[6] a fact especially true in areas of the country where graduate degrees are uncommon and the public health needs are particularly pronounced.

Nevertheless, a purely practice-based framework has its own challenges. The most obvious comes from the need to differentiate undergraduate and graduate practice-based degrees. Programs that require undergraduate students to have 30 or more hours of practice-based coursework will inevitably create substantial overlap with graduate programs. In addition, such a focus could miss opportunities to expose talented students interested in pursuing careers other than public health practice to the applicability of public health for people in any discipline. It is no secret within the field that public health suffers from a lack of understanding among the public. An undergraduate degree program narrowly focused to attract future public health practitioners may solve one problem while ignoring another.

BLENDING LIBERAL ARTS AND PRACTICE-BASED PHILOSOPHIES

Pursuing either a purely liberal arts or purely practice-based program may make sense for some programs. A college or university with a mission to serve the needs of the local population may choose a practice-based approach because its area has a low density of trained public health professionals and such a program can help ameliorate that problem. A college or university with a student body that typically pursues graduate education may choose liberal arts because their students who are interested in practicing public health will subsequently pursue a practice-based graduate degree. These and many other reasons may drive a program's decision to track in one direction or the other.

There is also great value in developing a program that blends liberal arts and practice-based philosophies. A blended program has the opportunity to attract a great diversity of students. If students see myriad possibilities with a degree in public health (as evidenced by graduates pursuing many different paths), there is a likelihood of bringing together students from diverse backgrounds with distinct interests. A blended program also has the ability to draw on existing strengths within a faculty while inviting new possibilities, such as collaboration in core curriculum classes with other departments. A blended program also finds a middle ground between the competing philosophies of education—that of learning as a means to an end and the other of learning as an end unto itself. This middle ground fits well with the ethos of public health as a discipline that recognizes health as having intrinsic value and as being an instrumental good.[4]

At Saint Louis University, we have attempted to create a blended program. Because the interdisciplinary nature of public health has been a key dimension to public health's success for our undergraduate program, we have intentionally placed value on liberal arts and practice-based work. As a relatively new academic program housed in the College for Public Health and Social Justice, we have taken lessons from the strong liberal arts core of the College of Arts and Sciences (hereafter, A&S) and the practice-based curriculum of

the College of Nursing and the College of Allied Health Professions. The blending of liberal arts and practice-based work not only occurs across the curriculum (e.g., Introduction to Global Health focuses on the values of public health while Contemporary Issues in Global Health focuses on the practice of public health) but also within coursework itself (e.g., Public Health and Social Justice requires students to evaluate public health interventions for their effect on vulnerable populations but also articulate why attention to vulnerable populations is an inherently desirable value).

Developing learning outcomes

When developing the curriculum, two types of learning outcomes emerged. Some outcomes were oriented around specific actions (e.g., "conduct a literature search" or "work with a team"), while others were general knowledge-based learning outcomes that we contextualized in public health (e.g., "articulate the value" of social justice and its application to health, health care, and health disparities; or "engage in systems thinking" to address health issues and problems). The Figure lists the liberal arts and practice-based learning outcomes for five of the public health courses. Certainly, one cannot separate action from the theory that underlies it, nor can an educated citizen be so without action. The two are not entirely separable. However, as we refine our curriculum, we attempt to include some learning outcomes in each course that emphasize public health practice and some that use public health theory as a lens for broad-based (liberal arts) thinking.

As a way of integrating this balance, four of the first six undergraduate courses require a substantial commitment to service learning. Service learning is enjoying a renaissance in higher education and provides learning outcomes that range from "understanding and application of subject-matter learning" to "citizenship skills and values."[14] To help achieve these outcomes, our faculty facilitate individual/small-group reflection and require written assignments on the connections between classroom concepts and community experiences. In so doing, we develop a resonance between what they do and who they are. A mutual reinforcement

Figure. Selected liberal arts and practice-based learning outcomes in undergraduate public health coursework at Saint Louis University

Required public health courses[a]	*Liberal arts learning outcomes*	*Practice-based learning outcomes*
Introduction to Global Health	Describe the roles and core functions of global health in a global society. Describe how globalization has changed the patterns and spread of disease.	Describe the socioecological framework and its usefulness in understanding behavioral interventions.
Contemporary Issues in Global Health	Articulate the value of diverse cultural approaches for addressing public health concerns.	Conduct a literature search on a health issue using a variety of academic and public resources.
Public Health and Social Justice	Articulate the concept of social justice and its application to health, health care, and health disparities. Discuss the role of gender, race/ethnicity, and other evolving demographics in affecting population health.	Identify ethical concerns in addressing public health challenges.
Evidence-Based Public Health	Engage in systems thinking to address health issues and problems. Explain the importance of basic measures of disease morbidity and mortality.	Interpret the source and quality of health information and data as related to individual and community health. Conduct a literature search on a health issue using a variety of academic and public resources.
Politics and Public Health Advocacy	Describe the role of community partnerships and alliances in promoting population health. Describe how policies and legislation impact population health.	Work with a team or a community group to address public health challenges. Participate in the political process to facilitate social justice and equity in health services.

[a]Required for students pursuing a Bachelor of Science in Public Health. All listed courses also have service-learning requirements, which have liberal arts and practice-based dimensions.

of these ideas, we believe, is a vital reason for blending practice-based and liberal arts education.

As a Jesuit, Catholic university, Saint Louis University draws upon a rich history of "contemplation in action."[15] Typical of the Jesuit tradition in education, our university mission statement speaks of the "knowledge and skills required to transform society." Knowledge is both self-knowledge that emerges from critically engaging the world as well as material knowledge that comes from classroom settings. The skills are not only about what to do but also the discerning wisdom of when, why, and how to do it. All practice-oriented degrees at Saint Louis University are expected to have a liberal arts core curriculum, and academic majors are expected to integrate the values of the liberal arts into the major-related coursework. Therefore, a blended liberal arts and practice-based approach is natural for our academic environment.

Students in A&S, the largest college at Saint Louis University, are required to take two classes on diversity as part of their core curriculum. One class must focus on global citizenship, and the other class should focus on diversity in the United States. Introduction to Global Health, the foundation course for students in the College for Public Health and Social Justice, has been approved to fulfill the global citizenship requirement for A&S students, and Public Health and Social Justice meets the A&S requirement for diversity in the United States. These two courses, required for every public health undergraduate student, are also valued by faculty in the humanities for the courses' ability to help students think about the way health, culture, and community inform how we behave as educated citizens—a liberal arts dimension. At the same time, non-majors are exposed to practice-based methods of public health through these courses. This cooperation with the humanities helps faculty in public health better understand the liberal arts and also advances the goals of the widely accepted Liberal Education and America's Promise framework to educate students for responsible citizenship within a global economy.[11]

The blended nature of the program at Saint Louis University has been a key factor in the diversity of students who are not public health majors or minors who choose to take public health courses as electives during their undergraduate studies. Introduction to Global Health and Public Health and Social Justice attract a wide variety of students. Theology and philosophy majors take the courses as supplements to their liberal arts degree. Nursing and physical therapy majors take the courses as additions to their clinical, practice-oriented programs. Additionally, exposure from one course often results in students changing majors and minors from political science, economics, sociology, biology, and many other programs to public health. Changes are not necessarily because students have discarded an old passion for a new one, but because they find public health to be an interesting application of longstanding interests.

Challenges of a blended program

The blending of liberal arts and practice-based curricula at Saint Louis University is not without its challenges. Many students enjoy the action-oriented nature of public health, so it can sometimes be difficult to create value for reflection and theory when they are in the midst of community projects. Yet, insisting on a depth of philosophical reflection, no matter how resistant students or faculty might be, in the end will produce more thoughtful and creative practitioners. It can be challenging to find a balance in course content, assessment methods, and service-learning expectations so that they meet the needs of students who want to be public health practitioners and students who see public health as a good social science foundation for other careers. In the end, both groups as well as faculty can be dissatisfied if the philosophy of the program is not properly explained. To address this challenge, we regularly gather as undergraduate faculty to review course content and assessment methods, and assure that they adequately cover public health learning outcomes. Moreover, we try to ensure faculty have the necessary resources to successfully transition from graduate-level practice-based education to undergraduate-level education more characterized by liberal arts. Providing necessary resources is done to exchange best practices and to ensure we maintain a balanced curriculum.

MOVING THE CONVERSATION FORWARD

Graduate-level programs in public health have achieved a consistency in philosophy because of the expectations of their accrediting body. This consistency is appropriate because employers and colleagues have a right to expect certain knowledge and skills from anyone with an MPH. A baccalaureate degree in public health, however, should not search for this level of consistency. The flexibility to meet the many different needs of undergraduate students should remain even if undergraduate programs go through an accreditation process.

The recently completed Undergraduate Public Health Learning Outcomes Model, developed by the Association of Schools and Programs of Public Health (ASPPH) in collaboration with the Association of American Colleges and Universities, the Association for

Prevention Teaching and Research, and the Centers for Disease Control and Prevention, has both liberal arts and practice-based dimensions.[16] The inclusion of a capstone experience that can be tailored to a student's future plans is a good sign that even a largely liberal arts-based program will require students to apply knowledge gained in the classroom in a community-based setting.

Allowing for this flexibility will lead to the benefits associated with the three types of programs described previously. One consideration might be the difference between a Bachelor of Arts (BA) in Public Health and a Bachelor of Science (BS) in Public Health. Although we at Saint Louis University value the blended nature of our program, other programs that tend to one end of the spectrum or the other might consider naming a liberal arts degree a BA and a practice-oriented degree a BS. Accrediting bodies might also consider retaining flexibility in curriculum development and learning outcomes by differentiating between the two degrees.

This discussion has obvious implications not only for the future of undergraduate programs but also for the future of graduate programs.[17] Most graduate curricula are currently designed assuming that students enter with very little formal background in public health. It will be necessary to ensure that students who have an undergraduate background in public health do not unnecessarily repeat content. Rather, strategies for eliminating redundancy will have to reflect the difference in types of undergraduate programs. Graduate programs will not be able to waive or substitute classes simply based on whether or not a student has a degree in public health, as undergraduate programs will emphasize different types of knowledge and competence. The need for articulation between the undergraduate and graduate degrees has been discussed previously,[10] and ASPPH has embarked on a project to set the future direction for public health education, which will naturally help to define the articulation.[16]

In an attempt to respond to these changes, Saint Louis University has begun the articulation discussion and developed an accelerated BS/MPH program. Although our coursework is blended throughout, it generally moves from liberal arts to practice-based coursework as students progress through the curriculum. In so doing, students' senior year is primarily practice-based, and many courses are borrowed from the first year of the graduate program (e.g., biostatistics, epidemiology, and behavioral science). This reconfiguring of courses allows capable students to achieve an MPH in five years. It also allows students who earn a baccalaureate degree without continuing into the fifth year of studies to emerge with a liberal arts foundation (i.e., the first several semesters of coursework), as well as the basics of public health practice (i.e., overlapping courses taken in the fourth year of studies).

An accelerated degree is not a universal solution because many undergraduate programs are emerging at universities that do not have accredited graduate programs in public health.[8] Modeling undergraduate program development off of graduate program development and accreditation could have a stifling effect on these and other programs at a time when public health is positioned to gain a larger role in public consciousness. Discussions will continue about the growth of undergraduate programs, the difference between and the articulation of undergraduate and graduate programs, and the accreditation of undergraduate programs. Openness to different models right now will provide the necessary data to make more informed decisions in the future.

Michael Rozier is former Director of Undergraduate Programs and an Adjunct Instructor in the Department of Epidemiology, and Darcell Scharff is Associate Dean of Academic Affairs and an Associate Professor in the Department of Behavioral Science and Health Promotion, both at the Saint Louis University College for Public Health and Social Justice in St. Louis, Missouri.

Address correspondence to: Darcell Scharff, PhD, MA, Saint Louis University College for Public Health and Social Justice, 3545 Lafayette Ave., St. Louis, MO 63104; tel. 314-977-4009; fax 314-977-8150; e-mail <scharffd@slu.edu>.

©2013 Association of Schools and Programs of Public Health

REFERENCES

1. Petersen DJ. Public health learning outcomes for all undergraduates. Divers Democr 2011;14:8-10.
2. Riegelman RK, Garr DR. Healthy People 2020 and Education for Health: what are the objectives? Am J Prev Med 2011;40:203-6.
3. Riegelman RK. Undergraduate public health education: supporting the future of public health. J Public Health Manag Pract 2007;13:237-8.
4. Koh HK, Nowinski JM, Piotrowski JJ. A 2020 vision for educating the next generation of public health leaders. Am J Prev Med 2011;40:199-202.
5. Gebbie K, Rosenstock L, Hernandez LM, editors; Institute of Medicine (US), Board on Health Promotion and Disease Prevention, Committee on Educating Public Health Professionals for the 21st century. Who will keep the public healthy? Educating public health professionals for the 21st century. Washington: National Academies Press; 2003.
6. Arnold LD, Schneider D. Advising the newest faces of public health: a perspective on the undergraduate student. Am J Public Health 2010;100:1374-80.
7. Bass SB, Guttmacher S, Nezami E. Who will keep the public healthy? The case for undergraduate public health education: a review of three programs. J Public Health Manag Pract 2008;14:6-14.
8. Hovland K, Kirkwood BA, Ward C, Osterweis M, Silver GB. Liberal education and public health: surveying the landscape. Peer Rev 2009;11:5-8.
9. Brown D. For a global generation, public health is a hot field. The Washington Post 2008 Sep 19.
10. Lee JM. Articulation of undergraduate and graduate education in public health. Public Health Rep 2008;123 Suppl 2:12-7.

11. Riegelman RK. Undergraduate public health education: past, present, and future. Am J Prev Med 2008;35:258-63.
12. Gebbie K, Merrill J, Hwang I, Gebbie EN, Gupta M. The public health workforce in the year 2000. J Public Health Manag Pract 2003;9:79-86.
13. Rosenstock L, Silver GB, Helsing K, Evashwick C, Katz R, Klag M, et al. Confronting the public health workforce crisis: ASPH statement on the public health workforce. Public Health Rep 2008;123:395-8.
14. Eyler J, Giles DE Jr. Where's the learning in service-learning? San Francisco: Jossey-Bass; 1999.
15. Barry WA, Doherty RJ. Contemplatives in action: the Jesuit way. Mahwah (NJ): Paulist Press; 2002.
16. Association of Schools of Public Health, Association of American Colleges and Universities, Association for Prevention Teaching and Research, Centers for Disease Control and Prevention (US). Undergraduate public health learning outcomes model. Washington: ASPH; 2011.
17. Fleming ML, Parker E, Gould T, Service M. Educating the public health workforce: issues and challenges. Aust N Z Health Policy 2009;6:8.

On Academics

THE RECOMMENDED CRITICAL COMPONENT ELEMENTS OF AN UNDERGRADUATE MAJOR IN PUBLIC HEALTH

Randy Wykoff, MD, MPH, TM
Donna Petersen, ScD, MHS
Elizabeth McGean Weist, MA, MPH, CPH

There is a growing interest in public health education at the undergraduate level. In 2009, *The Chronicle of Higher Education* referred to public health as one of five college majors on the rise.[1] New degrees, concentrations, minors, and courses have been added in public health and its related disciplines at a number of institutions of higher learning, including those without a history of graduate training in public health. Graduate-level training in public health has a long history of accreditation by the Council on Education for Public Health (CEPH), recognized by the U.S. Department of Education as the accreditation body for schools and programs of public health. However, CEPH does not provide guidance on what should be included in undergraduate training programs in public health, with the exception of programs located within accredited schools of public health.

As part of its Framing the Future: The Second 100 Years of Education for Public Health (hereafter, Framing the Future) initiative, the Association of Schools and Programs of Public Health (ASPPH) convened an expert panel to identify the critical component elements (CCEs) of an undergraduate major in public health. This work came on the heels of a joint ASPPH and Association of American Colleges and Universities (AAC&U) effort in 2011 that produced 34 learning outcomes in public health for all undergraduates, an initiative aimed at providing faculty, students, and administrative leaders in two- and four-year institutions a framework for helping produce educated citizens in public health.[2,3] This article reviews the CCEs, their purpose, and limitations, and also discusses some of the challenges associated with public health education at the undergraduate level.

FORMATION OF AN EXPERT PANEL

The Undergraduate Public Health Education Expert Panel selected to guide creation of the CCEs represented a broad cross-section of public health experts from academia and the practice world (Figure). Importantly, the academic representatives included topic area experts from both CEPH-accredited schools and programs in public health and institutions without CEPH accreditation. The expert panel also included a representative from AAC&U and one from the American Association of State Colleges and Universities. The practice community was represented by membership organizations of working public health professionals and by individuals with experience working at the state and local level. CEPH was also represented. The expert panel was chaired by one of the authors (Wykoff) and staffed by another (Weist). The overarching Framing the Future task force, a body created by ASPPH that advises on undergraduate public health issues for the association, is chaired by the third author (Petersen).

CHARGE TO THE EXPERT PANEL

The expert panel was charged with identifying and defining CCEs for bachelor's degrees in public health that prepare students to enter the workforce and/or to pursue advanced studies in public health or other health professions. Implicit in this charge was the realization that while many individuals with undergraduate degrees in public health seek further education, others enter the job market. The leadership of the expert panel chose the term CCEs to clearly distinguish the product from competencies and courses and to focus on what the panel felt were truly the essential requirements for adequate undergraduate education and training in public health.

Early in the process, the panel recognized a number

of issues that they would not be able to resolve within the scope of the charge. Rather than allowing these issues to inordinately delay their work, the panel identified several guiding principles:

The CCEs were understood to serve only as advisory recommendations. It would remain in the purview of CEPH, or other accreditation bodies, to determine if the CCEs could or should play a role in the accreditation of undergraduate programs in public health, should such accreditation occur in the future.

The CCEs were developed explicitly as broad, general statements. They do not require the teaching of any specific courses or the provision of detailed curricular content. The expert panel aimed for the CCEs to identify essential features (i.e., the what) to allow individual schools and programs flexibility in determining the means of delivering those essential features (i.e., the how).

It was understood that the CCEs would call for certain critical components that might be fulfilled through the general education requirements of the host university and, therefore, would not have to be provided separately as a part of the public health educational component.

Figure. Members of the Undergraduate Public Health Education Expert Panel convened by the Association of Schools of Public Health to specify critical component elements of an undergraduate major in public health: 2012

- Susan Albertine, PhD, Vice President, Office of Diversity, Equity, and Student Success, Association of American Colleges and Universities
- Lauren Arnold, PhD, MPH, Assistant Professor, College for Public Health and Social Justice, Saint Louis University
- Jack Barnette, PhD, MA, Professor of Biostatistics and Informatics, Colorado School of Public Health
- Sarah Bass, PhD, MPH, Associate Professor, Department of Public Health, College of Health Professions and Social Work, Temple University
- Ruth Gaare Bernheim, JD, MPH, Chair, Department of Public Health Sciences and Director of the Master of Public Health Program, University of Virginia School of Medicine
- Terry Brandenburg, MPH, CPH, Director of the Master of Public Health Program, Institute for Health and Society, Medical College of Wisconsin
- Tara Crowell, PhD, Associate Professor of Public Health, School of Health Sciences, The Richard Stockton College of New Jersey
- John Dreyzehner, MD, MPH, FACOEM, Commissioner, Tennessee Department of Health
- John R. Finnegan Jr., PhD, Professor and Dean, School of Public Health, and Assistant Vice President for Public Health, University of Minnesota
- Deborah Flynn, PhD, MPH, RN, Graduate Program Coordinator, Department of Public Health, Southern Connecticut State University
- Jeanette Jeffrey, MS, MPH, Professor of Public Health and Nutrition, Howard Community College
- Laura Rasar King, MPH, MCHES, Executive Director, Council on Education for Public Health
- Allen Meadors, PhD, LFACHE, Senior Fellow, American Association of State Colleges and Universities (current affiliation: Executive Director, Higher Education Coordination Council, United Arab Emirates)
- Clifford Mitchell, MS, MD, MPH, Director, Environmental Health Bureau, Maryland Department of Health and Mental Hygiene
- Jeffrey Oxendine, MBA, MPH, Associate Dean for Public Health Practice, School of Public Health, University of California, Berkeley
- Donna Petersen, ScD, MHS, Dean, College of Public Health, Professor of Global Public Health, and Senior Associate Vice President, USF Health, University of South Florida
- Richard Riegelman, MD, MPH, PhD, Professor and Founding Dean, School of Public Health and Health Services, The George Washington University
- Anita Siegel, RN, MPH, Director, Alameda County Public Health Department
- Henry Sondheimer, MD, Senior Director of Medical Education Projects, Association of American Medical Colleges
- Carleen Stoskopf, ScD, Dean, Graduate School of Public Health, San Diego State University
- Caryl Waggett, PhD, Associate Professor, Department of Environmental Science, and Chair, Global Health Studies, Allegheny College
- Terrie (Fox) Wetle, PhD, Professor of Health Services Research, Policy and Practice, and Associate Dean of Medicine for Public Health and Public Policy, Division of Biology and Medicine, Brown University
- Karen White, MPA, Director, Division of Leadership and Practice, Office of Surveillance, Epidemiology and Laboratory Services, Centers for Disease Control and Prevention (retired)
- Randy Wykoff, MD, MPH, TM, Dean, College of Public Health, East Tennessee State University (panel chair)

Perhaps most importantly, it was understood that the CCEs would not be able to address many unresolved issues related to undergraduate public health education. For example, the CCEs are silent on if/how an undergraduate degree in public health should articulate with a master's degree of public health. Additionally, the CCEs do not address the important issue of faculty qualifications. Finally, the CCEs neither require nor prevent an individual institution from having concentrations within an undergraduate degree program in public health.

Following direct meetings, webinars, and extensive public input, ASPPH released the Recommended Critical Component Elements of an Undergraduate Major in Public Health on August 3, 2012.

RECOMMENDED CCEs OF AN UNDERGRADUATE MAJOR IN PUBLIC HEALTH

Following are the four recommended CCEs of an undergraduate major in public health, along with specific areas on which undergraduate students should focus.

Background domains

Students should be proficient in the following content areas:

- ***Science.*** Students should have an introduction to the foundations of scientific knowledge, including the biological and life sciences and the concepts of health and disease.
- ***Social and behavioral sciences.*** Students should have an introduction to the foundations of social and behavioral sciences.
- ***Math/quantitative reasoning.*** Students should have an introduction to basic statistics.
- ***Humanities/fine arts.*** Students should have an introduction to the humanities/fine arts.

Skill areas on which students should focus include:

- ***Communications.*** Students should be able to communicate in both oral and written forms and through a variety of media to diverse audiences.
- ***Information literacy.*** Students should be able to locate, use, evaluate, and synthesize information.

Public health domains

Undergraduate students should be introduced to the following public health domains through their studies:

- ***Overview of public health.*** Students should have an introduction to the history and philosophy of public health, as well as its core values, concepts, and functions across the globe and in society.
- ***Role and importance of data in public health.*** Students should have an introduction to the basic concepts, methods, and tools of public health data collection, use, and analysis and why evidence-based approaches are an essential part of public health practice.
- ***Identifying and addressing population health challenges.*** Students should have an introduction to the concepts of population health and the basic processes, approaches, and interventions that identify and address the major health-related needs and concerns of populations.
- ***Human health.*** Students should have an introduction to the underlying science of human health and disease, including opportunities for promoting and protecting health across the life course.
- ***Determinants of health.*** Students should have an introduction to the socioeconomic, behavioral, biological, environmental, and other factors that impact human health and contribute to health disparities.
- ***Project implementation.*** Students should have an introduction to the fundamental concepts and features of project implementation, including planning, assessment, and evaluation.
- ***Overview of the health system.*** Students should have an introduction to the fundamental characteristics and organizational structures of the U.S. health system, as well as to the differences in systems in other countries.
- ***Health policy, law, ethics, and economics.*** Students should have an introduction to basic concepts of legal, ethical, economic, and regulatory dimensions of health care and public health policy, and the roles, influences, and responsibilities of the different agencies and branches of government.
- ***Health communication.*** Students should have an introduction to the basic concepts of public health-specific communication, including technical and professional writing and the use of mass media and electronic technology.

Cumulative experience and field exposure

Students should have opportunities to integrate, apply, and synthesize knowledge through cumulative and experiential activities. Students should have a cumulative, integrative, and scholarly or applied experience or inquiry project that serves as a capstone to their educational experience. And, as an integral part of their education, students should be exposed to local-level public health professionals and/or agencies that engage in population health practice.

Cross-cutting areas

Students should be exposed to concepts and experiences necessary for success in the workplace, further education, and lifelong learning. These cross-cutting areas may include advocacy for the protection and promotion of the public's health at all levels of society; community dynamics; critical thinking and creativity; cultural contexts in which public health professionals work; ethical decision-making as related to the self and society; independent work and a personal work ethic; networking; organizational dynamics; professionalism; research methods; systems thinking; and teamwork and leadership.

Throughout the curriculum, students should have a wide range of instructional methods and experiences that provide exposure to a solid foundation of the diverse nature of public health practice. In addition, students should receive career and graduate school advising.

LIMITATIONS AND REMAINING ISSUES

A number of challenges persist, even after the release of the CCEs. As noted previously, while the CCEs identify what should be included in an undergraduate public health training program, they do not specify how this material should be taught. Accordingly, the following questions require continued exploration:

- Should there be mandatory courses in the core areas of public health, as is required for CEPH-accredited Master of Public Health programs?
- Are specific qualifications for faculty who teach public health at the undergraduate level necessary?
- Should specific guidance be provided on whether a student with an undergraduate degree in public health should be granted advance standing or some other level of articulation if the student were to enroll in a graduate public health program?

Finally, in those schools that do not have a history of undergraduate training in public health, questions remain as to how local employers will view an undergraduate degree in public health, both on its own and in relation to those potential employees with higher levels of training.

While many of these issues will have to be addressed, it is hoped that the CCEs will provide appropriate and useful guidance for both new and existing programs that offer public health training at the undergraduate level.[4]

Randy Wykoff is Dean of the College of Public Health at East Tennessee State University in Johnson City, Tennessee. Donna Petersen is Dean and Professor of Global Health in the College of Public Health and Senior Associate Vice President of USF Health at the University of South Florida in Tampa, Florida. Elizabeth McGean Weist is Director of Special Projects for the Association of Schools and Programs of Public Health in Washington, D.C.

Address correspondence to: Elizabeth McGean Weist, MA, MPH, CPH, Association of Schools and Programs of Public Health, 1900 M St. NW, Ste. 710, Washington, DC 20036; tel. 202-296-1099 ext. 129; fax 202-296-1252; e-mail <eweist@aspph.org>.

©2013 Association of Schools and Programs of Public Health

REFERENCES

1. Fischer K, Glenn D. Five college majors on the rise. The Chronicle of Higher Education 2009 Aug 31 [cited 2012 Oct 18]. Available from: URL: http://chronicle.com/article/5-College-Majors-On-the-Rise/48207
2. Petersen DJ, Albertine S, Plepys CM, Calhoun JG. Developing an educated citizenry: the Undergraduate Public Health Learning Outcomes Project. Public Health Rep 2013;128:to come.
3. Albertine S, Petersen DJ, Plepys C. For the professional and for all: toward liberal education in public health. Peer Review 2012;14:24-7.
4. Association of Schools of Public Health. FAQs on the critical component elements [cited 2012 Oct 18]. Available from: URL: http://www.asph.org/document.cfm?page=1209

On Academics

DEVELOPING AN EDUCATED CITIZENRY: THE UNDERGRADUATE PUBLIC HEALTH LEARNING OUTCOMES PROJECT

Donna J. Petersen, MHS, ScD
Susan Albertine, PhD
Christine M. Plepys, MS
Judith G. Calhoun, PhD, MBA

In its seminal 1988 report, "The Future of Public Health," the Institute of Medicine (IOM) called public health "what we do as a society collectively to assure the conditions in which people can be healthy."[1] Public health interventions may occur in myriad institutions, through a variety of direct and indirect mechanisms in communities across the country. Yet, despite the many proven benefits of health approaches based on prevention and the well-being of populations, public health does not enjoy popular support and is poorly understood by most Americans.[2] The dominance of medical solutions to health challenges, even in the face of overwhelming evidence regarding the effectiveness of community-based preventive approaches, is illustrative of this broad lack of understanding. In 2003, the IOM suggested that the nation's health would benefit from a greater understanding of the profession's potential. To promote this enhanced awareness among the public, the IOM report called for every undergraduate to have access to education in public health.[3]

This call for broader public health education led to the formation of the Educated Citizen and Public Health initiative led by the Association for Prevention Teaching and Research, the Council of Colleges of Arts and Sciences, the Association of Schools and Programs of Public Health (ASPPH), and the Association of American Colleges and Universities (AAC&U). The initiative intended to respond to growing demand in the field and bring leadership to the suddenly explosive growth of courses and programs. The initiative further intended to introduce undergraduate study of integrative public health to all institutions of higher education and to take an interdisciplinary and inter-professional approach to collaboration.[4]

In recognition of the growth in undergraduate public health programs at colleges and universities, many without schools or programs of public health, ASPPH determined that it should actively engage in defining the learning outcomes and design of undergraduate public health programs. Many questions immediately surfaced: Should the traditional liberal arts be the recommended framework? Should programs prepare associate and baccalaureate graduates to enter the workforce? Should curricula include an internship or apprenticeship? Should programs focus on lifelong learning? How would an undergraduate public health degree articulate to existing master's degrees in public health? And what faculty development opportunities would be needed to support the integration of public health theory and content into other areas of inquiry in an undergraduate setting? In September 2009, ASPPH convened an Undergraduate Task Force to consider these issues and to develop a strategy for integrating public health knowledge and principles in undergraduate education.

TASK FORCE GOALS AND OUTCOMES

The ASPPH Undergraduate Task Force included representatives from Council on Education for Public Health-accredited schools and programs, AAC&U, and the Centers for Disease Control and Prevention. The group considered various approaches to guidance for existing and emerging undergraduate public health programs, including responses to the demand for clear guidelines for the structure and content of undergraduate public health majors. The meaning and approach to the need for an educated citizenry in response to the IOM's call likewise demanded attention. The task force concluded that there was a need for an educated citizenry and subsequently drafted a set of learning outcomes that could be used to infuse public health concepts into the existing undergraduate curriculum and co-curriculum.

The group was further inspired by the AAC&U Liberal Education and America's Promise (LEAP) initiative,[5] a 10-year effort to transform 21st-century undergraduate education, addressing a set of essential learning outcomes and a commitment to highly effective engaged or high-impact educational practices. The LEAP framework readily supports and addresses the objectives of public health learning and is philosophically attuned to public health. AAC&U surveys indicate that the LEAP essential learning outcomes represent consensus in the field of undergraduate education; therefore, their potential to support learning in public health is considerable.[6,7] The essential learning outcomes for all undergraduates include knowledge of human cultures and the physical and natural world, intellectual and practical skills, personal and social

responsibility, and integrative and applied learning. These outcomes call for undergraduates to engage in learning that seeks inter- and multidisciplinary answers to unscripted real-world problems.

Armed with the IOM call, the Educated Citizen and Public Health effort, and the LEAP framework, the task force was inspired to advance the public's knowledge of public health over time by reaching young adults while they are in college. The task force determined that the effort would be broadly focused on educating all undergraduates about public health, and that the audience would then necessarily be faculty, students, and administrative leaders in two- and four-year institutions. Hence, the group chose to use the essential learning outcomes framework of the AAC&U LEAP initiative rather than a more traditional public health framework to organize its work. The group further elected to develop a set of public health learning outcomes within the first three domains of the LEAP framework (knowledge, skills, and personal and social responsibility) and to return to the fourth domain—integrative and applied learning—after the first three domains had been populated with public health content, concepts, tools, and values.

The learning outcomes within each of these three domains were developed by a 10-member workgroup that included an equal number of representatives from the liberal arts and sciences and from public health. Cochairs represented each constituency. To accommodate the numerous people who wanted to participate, resource groups were created to support each appointed workgroup; in total, more than 130 people contributed to the development of undergraduate public health learning outcomes.

The workgroups that were formed around the first three domains developed a core set of learning outcomes within each domain, using an online modified Delphi approach to propose, consider, vet, and specify learning outcomes. Workgroup members offered as many suggested learning outcomes as they wished. Each workgroup culled the list in the first Delphi round following the modified Delphi survey results and corresponding workgroup discussion. Workgroup members voted to keep, discard, or modify each item and, in the ensuing discussion, duplicate items were eliminated, similar items were consolidated, and the highest-ranking items were retained and rephrased as deemed appropriate by the workgroup. For rounds two and three, workgroup members were joined by the resource groups in carefully considering and selecting the best set of learning outcomes through a similar voting approach.

From an initial list of 394 potential learning outcomes, the workgroups agreed on a set of 34 recommended learning outcomes (Figure), representing what the overall group believed all undergraduates, as educated members of society, should know and be able to do to promote their own and their communities' health. The concepts and skills articulated in these 34 learning outcomes are not intended to be prescriptive but selected as appropriate and integrated meaningfully into curricular and co-curricular learning opportunities. The list is not exhaustive; rather, it provides illustrative examples of how public health contributes to quality of life locally and globally. In addition, it illustrates how the science and art of public health can enhance understanding of the essential learning outcomes, as well as promote adoption of the LEAP framework in undergraduate education. This approach was designed for simplicity and flexibility in deployment. The learning outcomes do not call for a particular course or a specified curriculum; instead, they provide opportunities for the diffusion of knowledge across an existing set of educational experiences.

Learning outcomes

The 13 learning outcomes selected within the first domain—knowledge of human cultures and the physical and natural world as it relates to individual and population health—cover a variety of topics relevant to the humanities and the sciences. Some outcomes focus directly on public health knowledge, including its definition, governmental roles, and sentinel events in the development of the field. Other outcomes encourage an appreciation of community collaboration and an understanding of how diverse demographics within a community influence health. The outcomes invite comparisons of factors at the local, national, and global levels, including environmental hazards, risk factors for infectious and chronic diseases, and the leading causes of death. They further promote valuing the relationships among human rights and health, science and technology and health, and medical and public health services and health. One particular learning outcome, unique to this domain, points to the reciprocal relationships among literature, the arts, and public health.

The second domain—intellectual and practical skills—contains 10 learning outcomes that together focus on understanding health information and data and the methods of discovering and investigating related evidence; appreciating the multiple determinants of health and the interconnectedness of the physical, social, and environmental aspects of

community health, including the impact of policies, laws, and legislation; and developing skills in research, analysis, teamwork, and communication.

The 11 learning outcomes in the third domain—personal and social responsibility—range from endorsing prevention and promoting healthy lifestyle behaviors to engaging in both community-level health-promotion activities and the political process. Also included in this domain are ethics and social justice, the confluence of individual rights and the greater social good, diversity, valuing multicultural perspectives, and collaborating across the social spectrum to improve public health.

Developing the specific learning outcomes within these domains was a challenging and invigorating process. When the group progressed to considering the fourth domain—integrative and applied learning—the level of discovery rose even higher. The ways in which learning outcomes are applied contributes to the actual learning, skill development, and appreciation that will occur among undergraduate students and the faculty

Figure. Public health learning outcomes to facilitate the introduction of public health to undergraduate students: Association of Schools of Public Health, 2011[a]

Domain	*Learning outcomes*	
1. Knowledge of human cultures and the physical and natural world as it relates to individual and population health	1.1.	Define public health and related roles and responsibilities of government, nongovernment agencies, and private organizations.
	1.2.	Describe risk factors and modes of transmission for infectious and chronic diseases and how these diseases affect both personal and population health.
	1.3.	Describe the reciprocal relationships among literature, the arts, and public health.
	1.4.	List the leading causes of mortality, morbidity, and health disparities among local, regional, and global populations.
	1.5.	Discuss the role of gender, race, ethnicity, and other evolving demographics in affecting population health.
	1.6.	Discuss major local, national, and global health challenges.
	1.7.	Explain how the organizational structure, financing, and delivery of personal health-care and public health services impact population health.
	1.8.	Explain the influence that science and technology have on individual and population health.
	1.9.	Outline approaches for assessing and controlling environmental hazards that affect community health.
	1.10.	Assess the values and perspectives of diverse individuals, communities, and cultures and their influence on health behaviors, choices, and practices.
	1.11.	Appreciate the role of community collaborations in promoting population health.
	1.12.	Recognize the importance of key events and milestones in the history and development of the field of public health.
	1.13.	Value the relationship between human rights and health.
2. Intellectual and practical skills	2.1.	Describe how the methods of epidemiology and surveillance are used to safeguard the population's health.
	2.2.	Identify scientific data, including tools of informatics, and other information for assessing the well-being of a community.
	2.3.	Discuss the interconnectedness among the physical, social, and environmental aspects of community health.
	2.4.	Communicate health information to a wide range of audiences through an array of media.
	2.5.	Conduct a literature search on a health issue using a variety of academic and public resources.
	2.6.	Engage in collaborative and interdisciplinary approaches and teamwork for improving population health.
	2.7.	Analyze alternative viewpoints regarding a health topic.
	2.8.	Assess the source and quality of health information and data, as related to individual and community health.
	2.9.	Appreciate the multiple determinants of health.
	2.10.	Recognize the impact of policies, laws, and legislation on both individual and population health.
3. Personal and social responsibility	3.1.	Identify stakeholders who influence health programs and interventions.
	3.2.	Discuss the role of community engagement in promoting population health and social justice.
	3.3.	Outline individual and community preparedness considerations regarding health emergencies and public disasters.
	3.4.	Collaborate with others from diverse backgrounds in addressing health disparities and inequities.
	3.5.	Participate in the political process to improve health, social justice, and equity.
	3.6.	Analyze ethical concerns and conflicts of interest that arise in the field of public health.
	3.7.	Examine the fundamental right to health and health services.
	3.8.	Advocate for evidence-based social changes that improve the health of individuals and communities.
	3.9.	Champion the role of prevention in promoting a healthy community.
	3.10.	Endorse lifestyle behaviors that promote individual and population health and well-being.
	3.11.	Value multicultural perspectives and sensitivities on health.

continued on p. 428

Figure (continued). Public health learning outcomes to facilitate the introduction of public health to undergraduate students: Association of Schools of Public Health, 2011[a]

Domain	*Learning outcomes*
4. Integrative and applied learning examples	4.1. Define public health and related roles and responsibilities of government, nongovernment agencies, and private organizations. —Case study depicting the actions of a governmental agency, a nongovernmental organization, and a foundation in solving the mystery of widespread fish deaths in local lakes
	4.2. Describe risk factors and modes of transmission for infectious and chronic diseases and how these diseases affect both personal and population health. —Photo-voice assignment with local community senior centers capturing the key cultural, environmental, and economic assets and detractors related to cardiovascular disease in diverse populations
	4.3. Describe the reciprocal relationships among literature, the arts, and public health. —Literature, arts, and public health course with faculty from English, history, art history, and public health combining literary and historical readings, works of famous photographers, and discussions of important public health topics to (*1*) increase awareness of multidisciplinary approaches and (*2*) influence health behaviors and improvement
	4.4. List the leading causes of mortality, morbidity, and health disparities among local, regional, and global populations. —Team construction of questions and answers for a class "Jeopardy game" simulation regarding population group differences in morbidity, mortality, and health disparities
	4.5. Discuss the role of gender, race/ethnicity, and other evolving demographics in affecting population health. —Interactive seminar with students from various departments across campus (e.g., women's studies, ethnic studies, and public health) examining health disparities.

[a]Developed in collaboration with the Association of American Colleges and Universities and the Centers for Disease Control and Prevention. A complete list of domains and outcomes can be found on the Association of Schools and Programs of Public Health website at: http://www.asph.org/userfiles/learningoutcomes.pdf

that embrace their incorporation into curricula. Public health shines in this area because so much of what is accomplished in public health is carried out through integrative and applied approaches.

Domain four provides innovative and dynamic ways to integrate and apply the 34 learning outcomes from the first three domains in both in-classroom and out-of-classroom settings. For example, the focus of learning outcome four, domain two (intellectual and practical skills) is to "communicate health information to a wide range of audiences through an array of media." One way this outcome could be accomplished under domain four might be to engage a group of journalism students to develop a multimedia public information campaign promoting influenza vaccines among older adults. Students would need to understand the influenza virus, why a new vaccine is developed every year, why older adults are particularly susceptible to influenza, how that susceptibility translates into premature mortality and costly hospitalizations, and how that result impacts society at large. They would learn how health messaging and social marketing differ from other communication strategies and could be used to engage local health-care, public health professionals, and the media to complete this project.

Similarly, a political science or public policy class could stage a mock town hall meeting in which various stakeholders, including the local hospital, police department, school board, and leading employers in the community, review the latest health status report prepared by the local health department and consider approaches to improving health outcomes in the community. This activity would also address learning outcome one, domain three, "identify stakeholders who influence health programs and interventions." While the workgroup members were able to identify examples for every one of the 34 learning outcomes, it is more important that examples of the integration and application of the learning outcomes come directly from those using the learning outcomes in their educational settings. In this way, the adoption of undergraduate public health learning outcomes remains dynamic and fluid, leading to a continuously expanding knowledge base of ways to achieve the IOM's call for every undergraduate to be exposed to education in public health. Suggestions and examples on using the learning outcomes are welcome at learningoutcomes@aspph.org.

The benefits of a better-educated citizenry

If one can imagine a future in which greater numbers of people understand and appreciate public health and value its contributions to their lives, one can also envision a number of possible scenarios. It could be less common for college-educated people to argue

against fluoridation of municipal water systems or the promotion of healthy foods in school cafeterias. And it could be more common for people to demand better access to safe places for recreation, work-site wellness programs, or more consistent information about the performance of health facilities and providers in their communities. Expectations could evolve regarding improved consumer information, better labeling, enhanced accessibility to data, more walking and bike trails, increased efficiencies in public transportation, more open green spaces and community gardens, added openness to discussing various health-care reform strategies, as well as greater compassion and understanding of needs for those who become ill or disabled.

In addition to the overall benefits that could accrue from a better-educated citizenry, the public health workforce could potentially have a much larger pool from which to fill critical positions. State and local agencies and other institutions engaged in public health work are often willing to offer internships or, in some locales, employment to undergraduates with some knowledge of public health, even if their major is in a different field. Having undergraduates with a working knowledge of public health in other employment sectors should enhance the effectiveness of our overall systems and improve our success in efforts to promote community health. Finally, graduate schools and programs should benefit from a more informed applicant pool seeking advanced public health degrees and may be challenged to upgrade graduate-level courses and curricula in response.

Launching the initiative

Like many public health interventions, this initiative shows that developing the tool is the easy part; the challenge is in its adoption and implementation.[8] For the undergraduate public health learning outcomes to achieve their ultimate vision, they must be actively incorporated into learning opportunities in and outside of classrooms in two- and four-year institutions of higher education across the country. Public health professionals can contribute in many meaningful ways to realize this goal.

The primary audience for this effort includes colleges and universities without schools or programs of public health. As such, interested faculty and students will be looking for public health expertise in their communities. Local and state health agency personnel are a natural resource for this effort, as they bring not only a set of fundamental knowledge and skills but also important and timely issues that can be addressed by interested groups of students and faculty. Community-based public health professionals could provide guest lectures, lead discussions, host field trips, mentor individuals or groups of students, review student projects, supervise short-term internships, or advise student organizations that are interested in community health.

Faculty or student organization advisors in two- and four-year institutions who are interested in exploring relationships with local public health professionals should reach out to these individuals and agencies. The National Association of County and City Health Officials and the Association of State and Territorial Health Officials provide online directories to state and local health agencies and officials. Similarly, public health professionals can also be found in hospitals and long-term care facilities; in mental health, substance abuse, and homeless programs; in laboratories, schools, pharmacies, and health-care institutions; and in voluntary and professional organizations. Other community-based agencies such as law enforcement, fire departments, water and waste management, pollution control, and highway safety are often engaged in public health work and can be excellent resources for discussing public health issues through a variety of disciplines.

Students who are interested in the undergraduate learning outcomes can engage faculty in developing interesting ways to incorporate material within existing courses in all disciplines and fields. They can also use student organizations or create venues for adapting learning outcomes to various community or campus-based projects. Likewise, they can access social media to engage in discussions of how learning outcomes are reflected in current events, both on campus and in the larger community. They can further invite local, state, national, or international public health leaders to address the campus community on topics of particular interest to them. Finally, students who are interested in building their public health knowledge can create portfolios demonstrating their achievement of a set of learning outcomes.

CONCLUSION

For the first time, the most recent set of health objectives for the nation, Healthy People 2020, includes an objective directly related to undergraduate public health education.[9] It is clear that increased collaboration and concerted efforts need to be deployed to promote a deeper understanding of public health and its implications in communities around the country and around the world. Not everyone needs a degree in public health, but the benefits of public health enhancements to curricula in every discipline are

evident. A better-educated public, a better-educated workforce, and a more cohesive community response to public health and health-care challenges are all worth the effort to engage academicians and professionals from across the disciplinary spectrum. Public health is a social and economic imperative, and we can no longer afford to hold this knowledge within our profession. The time is now to work toward a truly educated citizenry if we are to achieve our health objectives and our humanitarian ideals.

This article was supported under a cooperative agreement from the Centers for Disease Control and Prevention (CDC) through the Association of Schools and Programs of Public Health (ASPPH) grant #CD300430. The contents of this article are solely the responsibility of the authors and do not necessarily represent the official views of CDC.

Donna Petersen is Dean of the University of South Florida College of Public Health in Tampa, Florida. Susan Albertine is Vice President of the Association of American Colleges and Universities Office of Engagement, Inclusion, and Success in Washington, D.C. Christine Plepys is Director of Research and Grants at ASPPH in Washington, D.C. Judith Calhoun is a Senior Research Investigator at the University of Michigan in Ann Arbor, Michigan. Dr. Calhoun served as a consultant to ASPPH on the Undergraduate Public Health Learning Outcomes Development Project.

Address correspondence to: Christine M. Plepys, MS, Association of Schools and Programs of Public Health, 1900 M St. NW, Ste. 710, Washington, DC 20036; tel. 202-296-1099; fax 202-296-1252; e-mail <cplepys@aspph.org>.

©2013 Association of Schools and Programs of Public Health

REFERENCES

1. Institute of Medicine. The future of public health. Washington: National Academy Press; 1988.
2. Taylor H. "Public health:" two words few people understand even though almost everyone thinks public health functions are very important. Harris Poll # 1. New York: Louis Harris and Associates, Inc.; 1997.
3. Gebbie K, Rosenstock L, Hernandez LM, editors. Who will keep the public healthy? Educating public health professionals for the 21st century. Washington: National Academies Press; 2003.
4. Association of American Colleges and Universities. The educated citizen and public health [cited 2012 Feb 2]. Available from: URL: http://www.aacu.org/public_health/index.cfm
5. Association of American Colleges and Universities. Liberal Education and America's Promise (LEAP) [cited 2012 Feb 2]. Available from: URL: http://www.aacu.org/leap/index.cfm
6. Association of American Colleges and Universities. National survey of AAC&U members (2009) [cited 2012 Feb 2]. Available from: URL: http://www.aacu.org/membership/membersurvey.cfm
7. New Leadership Alliance for Student Learning and Accountability. Committing to quality: guidelines for assessment and accountability in higher education [cited 2012 Feb 2]. Available from: URL: http://www.newleadershipalliance.org/what_we_do/committing_to_quality
8. Calhoun JG, Spencer HC, Buekens P. Competencies for global health graduate education. Infect Dis Clin North Am 2011;25:575-92.
9. Department of Health and Human Services (US). Healthy people 2020 [cited 2013 May 10]. Available from: URL: http://www.healthypeople.gov/2020/default.aspx

New Endowed Faculty Position in Violence Epidemiology

University of California, Davis, School of Medicine

UCDAVIS
UNIVERSITY OF CALIFORNIA

The Violence Prevention Research Program (VPRP) in the Department of Emergency Medicine is seeking to fill a faculty position at the Associate of Full Professor in Residence level. Its focus is on the design and execution of large-scale observational and experimental research into violence and its prevention. This faculty member will serve as VPRP's Associate Director and as the Vice Chancellor's Chair in Violence Prevention, an endowed position.

The Vice Chancellor's Chair will conduct independent research, collaborative research, teaching, and mentoring. Applicants must possess a doctoral degree in epidemiology, medicine, or a related discipline. There must be an established record of independent and collaborative research on violence or injury, including demonstrated experience in the design, conduct, and reporting of large-scale observational and/or experimental studies. The position is open to both clinicians and non-clinicians.

Please see full announcement at http://www.ucdmc.ucdavis.edu/vprp. Review of applications began in March and will continue until position is filled. Applicants should send a cover letter outlining their qualifications and areas of interest; a curriculum vitae; and contact information for five references to Garen J. Wintemute, MD, MPH, at gjwintemute@ucdavis.edu.

College of Public Health – Chair, Department of Biostatistics and Epidemiology

The East Tennessee State University (ETSU) College of Public Health is seeking applications for a nationally recognized leader to serve as Chair in the Department of Biostatistics and Epidemiology. ETSU has the only CEPH-accredited College of Public Health in Tennessee and has a strong commitment to high quality teaching and research, with a focus on inter-professional collaboration to improve the health status of the region, state and nation. The College is a full member of the Association of Schools of Public Health (ASPH) and home to the Tennessee Institute of Public Health and the Tennessee Public Health Training Center.

The Department of Biostatistics and Epidemiology is prime for an energetic and visionary leader who will continue to grow the department in scale and impact. The department's educational programs include the MPH in Epidemiology (offered both on-ground and online), DrPH in Epidemiology, MPH in Biostatistics, and graduate certificates in Epidemiology and in Biostatistics. An overview of the department and its programs can be found on the departmental website:
http://www.etsu.edu/cph/biostat_epidemiology.

Applicants should have a terminal degree in epidemiology, health research methods, biostatistics, medicine, social & behavioral science, or related discipline. Those without a degree in epidemiology, but who have post-doctoral training in epidemiology, such as former Epidemic Intelligence Service officers, or those who have extensive directly relevant professional epidemiologic or biostatistics experience are encouraged to apply. Candidates should possess a professional history consistent with appointment as associate or full professor. Demonstrated administrative and leadership experience is required. Significant experience with extramurally funded research is strongly preferred. Graduates of ASPH-member schools are encouraged to apply.

College of Public Health
East Tennessee State University

Interested candidates should address a cover letter describing their research and teaching experience, listing of contact information for three references, and curriculum vitae to: **http://jobs.etsu.edu**. Candidates may also contact **Dr. Rob Pack, Associate Dean of Academic Affairs, at packr@etsu.edu or by calling 423-439-4540.**

AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

Writing for *Public Health Reports*

Public Health Reports (*PHR*) welcomes contributions that complement the mission and purpose of the Journal:

- To facilitate the movement of science into public health practice and policy to positively affect the health and wellness of the American public.
- To publish scholarly manuscripts that describe new and innovative ways to deliver essential services, leading to improved quality, enhanced efficiency, and reduced costs.
- To publish evaluations of public health programs that describe models of practice that can be replicated by others and that describe lessons learned.

PHR conforms to *Uniform Requirements for Manuscripts Submitted to Biomedical Journals*, which is available online at http://www.icmje.org/index.html, including all ethical considerations. International authors are strongly encouraged to seek writing and editing assistance from a native English-speaking editor prior to submitting their manuscript. Submit manuscripts electronically as one inclusive attachment in a Microsoft® Word or PDF file to: Editor, *Public Health Reports*, e-mail <manuscripts@publichealthreports.org>.

We accept manuscripts in each of the following categories: original research (qualitative and quantitative), public health evaluation, public health methodology, case study/practice, brief report, reports and recommendations, systematic review, commentary, and letter to the Editor. Potential authors should indicate for which category papers are to be considered and be familiar with review criteria for that category. Category-specific descriptions, acceptable word counts and number of tables/figures, manuscript formatting, and review criteria are available at: URL: http://www.publichealthreports.org/Authors.cfm#writing. Published manuscripts are indexed or abstracted in MEDLINE/PubMed, Current Contents, EMBASE/Excerpta Medica, Pais International, LexisNexis, and EBSCOhost.

WHAT TO EXPECT AFTER SUBMISSION

Corresponding authors will receive acknowledgment of receipt within 48 hours. Typically, decisions regarding external peer review are provided within two to three weeks. External peer review does not imply acceptance for publication by *PHR*. Evaluation criteria for all submissions include, but are not limited to the following: addresses at least one of the core public health functions (http://www.cdc.gov/nphpsp/essentialServices.html), increases the body of knowledge on the topic, employs clear and succinct writing that is free of jargon, offers results/conclusions based on data provided, and is not overly influenced by the opinions and biases of the authors.

YOUR SUBMISSION

Page numbering and line spacing/numbering: To aid in the review process, please include page numbers, use continuous line numbering, and use 1.5-line spacing. Manuscripts should be formatted with 0.75-inch margins on all sides and use 12-point Times New Roman font.

Cover letter: When submitting your manuscript, include a cover letter that contains the following information:

- A description of the article and explanation of why it is unique, relevant, and applicable to *PHR*.
- A statement that the material has not been published nor is being considered for publication elsewhere.
- A statement indicating Institutional Review Board determination (approval or waiver) for all studies involving people, medical records, and human tissues.
- A statement regarding any potential conflict of interest.
- A disclosure noting any similar or related work submitted or published elsewhere.

Title page: (*a*) title (short and descriptive); (*b*) working title; (*c*) full names of all authors, including their graduate degrees (please limit number of authors to 10); (*d*) all authors' institutional affiliations and job titles during the course of the research (and current affiliation and title for corresponding author if different); (*e*) name, advanced degrees, affiliation, street address, telephone number, fax number, and e-mail address of corresponding author; (*f*) word count of the text (exclusive of abstract, tables, and references), and the number of charts, tables, and figures.

Abstract: The abstract is published in various medical indexes; therefore, it should be written clearly and succinctly. Structured abstracts of research articles (250-word maximum) should contain four parts labeled Objectives, Methods, Results, and Conclusions. Unstructured abstracts should be a maximum of 150 words without abbreviations, symbols, or references to tables or figures. Numerical references should not be included in the abstract.

References: References follow *Citing Medicine: The NLM Style Guide for Authors, Editors, and Publishers* [Internet]. 2nd edition. Available from: URL: http://www.ncbi.nlm.nih.gov/books/NBK7256. Numerical references should not be embedded in the text (i.e., please do not use the "Footnote and Endnote" function in Microsoft® Word for references). Citations of personal communications or unpublished material should appear in the text in parentheses. *PHR* does not use substantive footnotes.

Tables and figures: Tables and figures should be placed after the references, each on its own separate page. See criteria for specific types of manuscripts to learn of table and figure limits per manuscript (http://www.publichealthreports.org/Authors.cfm#writing).

COPYRIGHT

It is a condition of publication in the Journal that authors, excluding authors employed by the U.S. government, assign copyright to the Association of Schools and Programs of Public Health (ASPPH). Authors may use their own material in other publications provided *PHR* is acknowledged as the original place of publication. Material published in this Journal may be used, modified, reproduced, and distributed by the U.S. government for government purposes.

PEER REVIEW

After an initial review by our Editorial Committee, we select promising contributions for peer review; these manuscripts are sent to two or more external reviewers. Recommendations of peer reviewers will not be accepted from authors. For manuscripts being considered for publication after peer review, authors will be required to make a point-by-point response to all peer-review comments and include these responses along with the revised manuscript. The *PHR* Editor makes final decisions on all submissions and will not engage in discussion with authors related to those decisions.

CONTRIBUTIONS TO THE FROM THE SCHOOLS AND PROGRAMS OF PUBLIC HEALTH SECTION

Contributions by ASPPH member faculty and students are also needed for the three ASPPH-sponsored columns of the Journal. Faculty members may submit articles for the following two columns: *On Linkages*, practice-based activities at the schools and programs; and *On Academics*, articles about academic public health.

Students, fellows, or working professionals up to two years postgraduation from ASPPH member schools may submit articles for the *Student Column*. Information on the *Student Column* may be found at: URL: http://www.publichealthreports.org/resourcecenter/StudentColumnPublicHealthReports_flyer.pdf.

To submit your work for any of the ASPPH columns (*On Academics*, *On Linkages*, or the *Student Column*), first e-mail an abstract to PHRSubmissions@aspph.org using these guidelines found at: URL: http://www.asph.org/document.cfm?page=713. A review committee will decide whether to request a full manuscript.

For complete *PHR* Writer's Guidelines, go to http://www.publichealthreports.org/Authors.cfm#writing

Mary Beth Bigley,
DrPH, MSN, ANP
Acting Editor
marybeth.bigley@hhs.gov

Subscription Information
ISSN 0033-3549
6 issues per year
Questions? E-mail: support@publichealthreports.org

To Subscribe
Order online at www.publichealthreports.org/OrderNow.cfm, or complete this form and mail with payment to:

Public Health Reports
c/o ASPPH
1900 M St. NW, Ste. 710
Washington, DC 20036

If paying by credit card,
fax this form to: 202.296.1252.

PUBLIC HEALTH *Reports*

Subscribe to *Public Health Reports*

Public Health Reports (*PHR*) is an informative and accessible resource for practitioners, teachers, and students of public health. The Journal provides important research and key discussions on the major issues confronting the public health community:

- Up-to-date information on disease prevention, health promotion, public policy, and interventions
- Articles on contemporary issues such as tobacco control, immunization, civilian preparedness, drug policy, lead screening, Native American health, tuberculosis control, occupational disease and injury, and environmental justice
- Original, peer-reviewed research and public health practice articles, as well as thoughtful commentary

Public Health Reports Acting Editor, Mary Beth Bigley, Office of the Surgeon General, Department of Health and Human Services. Official journal of the U.S. Public Health Service published through an agreement with the Association of Schools and Programs of Public Health. *PHR* is abstracted/indexed in MEDLINE/PubMed, Current Contents, EMBASE/Excerpta Medica, Pais International, and LexisNexis.

www.publichealthreports.org

Return this completed card TODAY to renew your subscription to *Public Health Reports*!

	Print Only	Online Only*	Print and Online*
Individual	☐ $90.00	☐ $90.00	☐ $150.00
Institutional	☐ $167.00	☐ see website for pricing	☐ see website for pricing
Student**	☐ $50.00		

International Shipping Charge (outside North America): $50.00

Rates effective August 1, 2013. Price in U.S. dollars and payable in U.S. funds. Price subject to change.

* Includes online access via individual logon account only for individuals, IP address authorization for institutions. Other restrictions apply. Please visit www.publichealthreports.org/OrderNow.cfm for complete details.

** For student subscriptions sent to North America only; students outside of North America must pay individual rate.

Name _____

Institution _____

Address _____

City _____ **State** _____ **Zip** _____

Country _____

E-mail _____
(for online access)

Degree _____ **Date of Graduation** _____
(for student rate) **(for student rate)**

How did you hear about PHR? _____

☐ **Check enclosed** (Payable to ASPPH)
☐ **MasterCard** ☐ **VISA** ☐ **American Express**

Credit Card Number

_____ _____
Exp. date **Name printed on credit card**

_____ _____
Signature **Date**

SEPTEMBER/OCTOBER 2013 PUBLIC HEALTH REPORTS VOLUME 128 NUMBER 5 PAGES 349–432 ASPPH